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WIRELESS TELEGRAPHIC SERVICE BEGUN ACROSS THE ATLANTIC.

As had been promised by Mr. William Marconi, on Thursday, October 17, wireless service across the Atlantic was opened. This transmission takes place between Glace Bay, Nova Scotia, and Clifden, Ireland. During the first day, it is said, ten thousand words were transmitted altogether, in both directions. These included a number of enthusiastic congratulatory messages in recognition of the important event, and prophesying the benefits to humanity which must follow from the developing and putting into actual service of the new system of communication. Judging from the reported success of the first day's public trial, there is no reason to expect anything but continued good working, so that the date on which this service was inaugurated is an important epoch, not only in the history of wireless telegraphy alone, but in that of all systems of communication. It is true, of course, that for some time past Mr. Marconi and others have said that they had maintained excellent communication across the Atlantic, but when a system is put into service, as now has been done, it must be considered as having passed out of the experimental state and entered into one of actual use. Moreover, since the announced rates for transmission are very much lower than those of the cable companies, in spite of the fact that the latter system has been in service for about forty years, the new system can certainly expect to secure as much business as it can handle. Just what proportion of the whole this will be remains to be seen. It must be remembered that at the present time at least, these two stations can send but a single message at a time, and the rate of transmission is not high.

No one can tell now what place the wireless, or rather the radio-telegraphic, system will take. The expense of the apparatus is trifling compared with that of the cable, and it will not be subject to breakdowns, or failures, in parts a mile or more under water. On the other hand, the problem of preventing interference between stations has not yet been completely solved, so that the application of the system must yet remain somewhat limited. Nevertheless, the possibilities are very great. There seems to be no reason now why communication with the Antipodes may not be established, provided, of course, sufficient power can be radiated. But if everyone else must be silent while one of us is talking to Australia, the system is, in one sense, handicapped.

Whatever may be the outcome of this telegraphic development, certainly Mr. Marconi must be given all credit, not

only for the truly wonderful work he has done, but also for his faith in the system and his persistency in carrying it from good to better. To-day he is applauded by all the world for his magnificent achievement, and his work is greeted by the wondering praise of people grown accustomed to modern wonders, but who, to-morrow, when "little men, of little souls, rise up to buy and sell again," will turn to some new feat, forgetting the real importance to civilization of the system which Marconi has put into service.

POWER DISTRIBUTION FROM BLAST FURNACES.

A suggestive paper was read by Mr. B. H. Thwaite before the Iron and Steel Institute during its recent meeting in Vienna, in which he described a proposed system for distributing power economically from blast furnaces.

Although iron works have made pretty free use of the electric motor for various purposes, only recently has it been possible to use this device for all the work at furnace and mill. Until a short time ago an economical method of driving the rolls in the rolling mills, by means of an electric motor, had not been developed, a work, as is well known, irregular and very severe. Now, by means of some of the power storage systems, the work of the rolls can be done economically by motors, and without disturbing the other apparatus supplied from the same power station. This stage having been reached, it becomes possible to displace the steam engine entirely from blast furnace and rolling mill work, replacing it by gas engines driving generators, which supply current to motors distributed throughout the plants. By so doing, the gases from the furnace are utilized more efficiently than when burned under steam boilers, and more power may be generated from them than is needed at the furnace and in the rolling mills. This power may then be disposed of at a profit to other industries.

To do this efficiently, however, is not entirely simple, since the work of the mills varies from time to time, although the furnaces may be run fairly continuously. The demand of the mill may be heavy during a few weeks and then decrease considerably, so that some system must be devised which will make it possible to dispose of the largest amount of surplus power. The method proposed by Mr. Thwaite is to have the blast furnaces in one district pool their excess power. Should these furnaces be grouped close together, they might all transmit their gas to a central generating station; but this arrangement would seldom be possible, so that in most cases it would be better for each establishment to have its own generating plant, which would supply the power it needs and send what is not needed there to a central distributing station, from which it would be supplied to other establishments. In this way a fairly uniform supply of power could be assured, and at any time when the supply at one establishment fell short of the demands there, the mill could always call upon the main distributing station to help it out.

An objection to the electrification of rolling mills has been the cost of the transformation. It is usually assumed that this necessitates condemning the old steam machinery, replacing it with gas engines costing more than the steam engines, which in turn drive large electric generators supplying power to the various motors. Although such a system might prove very efficient as a power consumer, there would be little gained in this respect, since the gases not used in the engines would be wasted in the air; and there is, therefore, no reason to incur the expense which would be necessitated. Nor could such a system alone dispose of much power outside, since it could not guarantee a large, steady supply. By the pooling plan suggested, the aspect of the problem is changed, for then the sale of power to other consumers should make the generating stations profitable, and in this case the iron works need only be charged with the cost of the motors. It is possible that if such a plan be adopted it might be necessary to install a gas producer so as to be prepared for all contingencies; but this producer could be small and its cost would not be great. Mr. Thwaite believes that such a system could be put into immediate service, and that besides the technical value of making a more efficient use of the furnace gas, it would constitute a much-needed source of cheap power. The iron works would then draw around them a number of industries in which cheap power is a necessity, so that eventually each furnace would become a power centre.

With each advance in industrial methods cheap power seems to become a greater need for many industries. In fact, during the last ten years, a goodly number of new industries have been made possible by the utilization of our water-falls: in other words, by the production of cheap power. Every civilized country to-day is turning its attention to this source of power, and it is probable that one of the most important problems to be solved, during the next few years, will be the economic and efficient utilization of such resources. In addition to these, all other power resources will be developed and utilized. The plan suggested by Mr. Thwaite practically adds another to those before recognized, for although it was realized that the methods employed in iron works were wasteful, it was necessary to have some plan which would enable this power to be distributed commercially, and it is to be remembered that the iron works are not the only offenders in this waste of valuable fuel. The coke ovens are another, and they too could be harnessed in the same way, and thus add considerably to the available power. Moreover, since the coke ovens are usually operated at the mines, where there are also large piles of rejected fuel, the latter could be turned into power in suitable gas generators, which could act as a reserve to the ovens. The utilization of all of this power depends upon the ability to distribute it to the proper points; for, although, in some instances, other industries may be drawn towards the points where the gas is formed, much of the power must necessarily be disposed of at a distance. To do this there seems to be but one system available; that is, transmission by high-tension electrical currents. We are to-day, fortunately, prepared to undertake such work, and it is not improbable that before long some such plan as that suggested by Mr. Thwaite will be put to trial.

A NEW SINGLE-PHASE RAILWAY SYSTEM.

During the past five years, following Lamme's noteworthy paper before the American Institute of Electrical Engineers, which described a new single-phase railway system, there have been many such systems proposed and even tried. These have, almost without exception, used some form of commutator motor, although the characteristics of the motor have varied greatly, according to the type of winding with which it was provided. It has all along been recognized that the commutator was a disadvantage, but this is not a disadvantage peculiar to the single-phase motor alone, as the direct-current motor itself is handicapped on account of this necessary, though somewhat delicate, device. It is true that the alternating-current motor is more severely handicapped in this respect, because the conditions during commutation are more trying, but the necessity for a commutator is not, to-day, sufficient to condemn a motor unless some equally good system can be devised in which this weaker point is eliminated. An attempt to do this has been made by A. Heyland. His method is described in *Electrical Engineering* (London), a brief abstract of the article appearing on another page of this journal. Mr. Heyland takes a most discouraging view of the afflictions introduced by the commutator. He also finds other faults with the single-phase commutator railway system, believing that the methods of control are not perfect, or that they call for heavier apparatus, and that the entire equipment is bulky and expensive. These objections are, of course, relative, in comparison with a standard direct-current equipment.

The system which he proposes he believes sufficiently free from such objections to justify the above criticisms. In brief, it consists in coupling two induction motors in cascade, and connecting a third motor to the intermediate point between the driving motors. The first, or primary, motor draws single-phase current from the supply system. Three-phase currents are drawn from its rotor and applied to the stator of the secondary driving motor, and a rheostat is connected in the rotor circuit of the latter machine to facilitate starting. The third machine runs idle. It is excited and its secondary either supplies polyphase currents to the intermediate connection of the two driving motors, or, when braking, receives current from these machines. This arrangement, since the idle motor is running constantly, supplies polyphase currents for exciting the driving motors at the moment of starting. This not only sets up the necessary torque for starting, but supplies also the exciting current, so that true power only is drawn by the main motors from the supply circuit. This condition, of operating at unity power-factor, can be maintained during running and at the start.

At the start, the idle motor is running at its highest speed. As the driving motors speed up they absorb power from this motor and slow it down. The reverse process takes place as the driving motors are being stopped, as they then speed up the rotor of the idle motor. In this way, power, which would otherwise be wasted in braking, is stored up to be used when the following start is made. The idle motor used for this purpose may be of various types, being either a synchronous or induction machine, or even a current converter of some type. The advantages claimed for this system are: the high power-factor which results; the use of standard induction motors having no commutators; the elimination of the transformer, since the high-potential of the distributing system may be applied directly to the motors, and the control which is secured over the latter.

Unfortunately, no results of experiments are given to substantiate these claims. It is true the commutator is an objection, but heretofore the engineers of this country have considered this less serious than the use of many overhead wires. If, as is said, a good deal of space is saved by the proposed system, this is an advantage, since the great bulk of the single-phase commutator motor has made it very difficult to design it in large sizes.

The advantage of using standard motors is not very great, since any successful type of railway motor will become itself a standard machine. The elimination of the transformer is an advantage, but this is offset by the introduction of the third motor; so the gain does not seem to have been without some sacrifice. Whether, on the whole, a better system will be secured, actual experience only can decide. It is to be hoped that the inventor's expectations will not be entirely unfulfilled.

ELECTRIC RAILWAY COMPETITION.

In an effort to determine to what extent the electric railway is affecting steam railroad traffic, the *Railroad Gazette* has conducted an inquiry among all the steam railroads which are at all likely to have felt the effects of the new system. The results are given in the issue of October 11, and they show in a striking way how important the electric system is becoming as a means of travel. The statistics have also been compiled from the interurban roads—that is to say, roads having a cross-country run of at least ten miles. It is notable that there are over 3,300 miles of such systems in operation, on which the cars make an average of nearly twenty miles an hour, and on which the average rate for travel is less than one and one-half cents a mile. During the last year, it is said, the average rate charged on the steam roads is 1.85 cents, and when it is remembered that usually the electric roads are more convenient to reach and offer a more frequent service, their importance as competitors of the steam roads is evident. The latter, it seems, are able to hold their own for long-distance runs where higher speeds can be made.

Although in the Middle West, where the competition has been most severe, the steam roads have made no attempt to secure control of the electric roads, the *Railroad Gazette* believes that unless the law prohibits this during the next ten years, the tendency will be towards such control. This interurban business is one of great promise and it has only been begun; therefore, it seems that to protect themselves, and to secure part of this business, the steam roads should work with the electric roads, whether they control them or not.

Temporary Receivership for Westinghouse Companies.

Judge Nathaniel Ewing, in the United States Circuit Court, Pittsburg, Pa., on October 23, appointed receivers to take charge of the Westinghouse Electric and Manufacturing Company, the Westinghouse Machine Company and the Security Investment Company. The receivers for the Westinghouse companies were named after several conferences between bankers and the directors of the companies. The following have been named as receivers: For the Westinghouse Electric and Manufacturing Company—T. Hart Given, president Farmers' Deposit National Bank; H. S. A. Stewart, real estate dealer, and E. M. Herr, vice-president of the Westinghouse Electric and Manufacturing Company. For the Westinghouse Machine Company—William McConway, president McConway & Torley Company; W. H. Donner, president Union Improvement Company; and E. E. Keller, vice-president Westinghouse Machine Company. The Fidelity Trust Company, of Pittsburg, was named receiver for the Security Investment Company. Nernst Lamp Company receivers were appointed later in the week.

The applications for receivers state that owing to the stringency in the money market it was found impossible, at the present time, to get money with which to carry on the business of the companies, and that it is for the best interests of the stockholders, the employés, and the creditors that the court appoint receivers to carry on the business, rather than close down. The bill sets forth that each of the companies is solvent, has large orders, and that it is to the best interests of all concerned that the contracts now on hand be carried out.

The court made an order that the receivers be authorized to purchase such material as might be necessary to carry on the business of the companies.

Immediately upon the appointment of the receivers, President George Westinghouse issued the following statement:

"When the Pittsburg Clearing-House committee, after full investigation and conference with me, concluded that although the Westinghouse Electric and Manufacturing Company and the Westinghouse Machine Company were solvent, receiverships were advisable as the best means of protecting the interests of all concerned, it was clearly our duty to follow their friendly advice.

"The necessity for the receiverships is due solely to the acute financial stringency and consequent inability to renew our maturing paper. Both the electric company and the machine company are solvent and are doing the largest and most satisfactory business in their history and each company is earning liberal dividends on its stock and has quick assets equal to its liabilities.

"I most confidently believe that every creditor of each company will be paid in full and that through wise management under the direction of the receivers appointed by the court the properties will soon be restored to the stockholders.

"The loans to the Security Investment Company and myself are secured by stock of the Westinghouse Electric and Manufacturing Company and the stock of the Westinghouse Machine Company, the decline in the market value of which on Monday and Tuesday of this week made it impossible for us to margin our loans.

"I strongly advise all holders of such loans to hold their collateral, the value of which I am confident will in time be sufficient to pay the loans. The sacrifice of the collateral in the present condition of the market can benefit no one. A policy of patience and forbearance is what the situation requires."

Leading bankers and business men of Pittsburg and New York emphatically declare that, despite the fact that the companies had been unable to obtain ready money, the confidence of the community has not been shaken. It is well understood that the application for the appointment of receivers was due to an intelligent determination to conserve the vast interests involved. The value of the orders on hand aggregates a total greater than at any time in the history of the company, and it is thoroughly believed that the situation is temporary and will be relieved in the very near future.

Troubles Due to Grounding the Neutral Point of High-Tension Transmission Systems.

During his discussion of the advantages of and troubles due to grounding high-tension transmission systems, which took place at the recent meeting of the American Institute of Electrical Engineers, Dr. C. P. Steinmetz made the following points:

There are many things which are feasible and safe on the western long-distance transmission lines which would be disastrous in an eastern underground cable circuit. Where the resistance of the circuit is considerable, of a magnitude such that the effect of the resistance is comparable with that of the capacity, as is usually the case in a long-distance transmission line, then it is feasible to run in an unbalanced electrostatic condition; it is feasible to dead-ground the neutral, the current being limited, and oscillations, high-frequency disturbances, being blocked by the dead resistance. In the underground cable system the problem of keeping down the temperature of the cable limits the resistance of the cable to such values that the resistance effect is practically negligible compared with the capacity effect. Another problem liable to result from grounding the neutral is due to the ground currents flowing from the neutral, which may reach serious values, especially where several neutrals are grounded. Another trouble is, upon grounding the neutral an additional electromotive force, usually of treble frequency, generated in the generators or the transformers, changes the shape of the potential wave between the ground and line and, by making a sharp peak, raises the potential difference of the conductors against the ground to as much as forty per cent or more beyond their normal values. These higher frequency voltages may lead to serious surges or high-voltage oscillations.

The neutral should be grounded where the system can not be operated safely because of electrostatic unbalancing. If a ground appears on one of the phases in the ungrounded system, then electrostatic unbalancing occurs before the other two line conductors rise to full potential difference against ground. A grounded system, in this case, shuts down. There are two kinds of electrostatic unbalancing by grounding one conductor, first, a continuous ground or dead-ground, and second an intermittent or oscillatory ground, an arcing ground or spark discharge. The electrostatic unbalancing due to the continuous or permanent ground on one phase leads to a high potential difference between the three phases and ground, and may be serious in a system of high potential, 100,000 volts. As a rule it should not be serious, but should be well within the margin of insulation safety of an ordinary medium or high-voltage system.

The intermittent or oscillatory ground leads to serious high-potential, high-frequency disturbances, which may lead to a rapid destruction, and are the main causes of the unsuccessful operation of ungrounded underground cable systems where such operation has not been quite successful.

New York Electrical Society.

The regular meeting of the New York Electrical Society will be held at Columbia University on Wednesday evening, October 30. The paper of the evening will be entitled "A New Development in Lubrication," by E. G. Acheson.

American Electrochemical Society.

The twelfth general meeting of the American Electrochemical Society was held in New York city, October 17, 18 and 19. This is the first of the short fall meetings which the society will hold and the attendance was unusually good. Unfortunately, however, the programme of papers was about as long as usual although there were but two sessions available for their reading and discussion. On account of this the discussions, in general, were brief and lacking in interest or altogether omitted. This is to be regretted as some of the papers were of much interest.

The session on Thursday, October 17, was held in the Chemists' Club and was preceded by a meeting of the board of directors. It was followed by a general reception and two lectures, one delivered by Dr. George F. Kunz on "Diamond and Moissanite; Natural, Artificial and Meteoric," and the other by E. G. Acheson on "Deflocculated Graphite." The latter was in substance the same as the address delivered before the American Institute of Electrical Engineers at its recent convention at Niagara Falls, and was reported at that time. Sessions for the reading and discussion of papers were held on Friday morning at the Chemists' Club and Saturday morning at Columbia University. Friday afternoon an excursion was made to the laboratories of Thomas A. Edison, at West Orange, N. J., and in the evening there was a dinner at the Liederkranz Hall, in New York. Saturday afternoon two excursions were provided—one to the Pennsylvania Railroad Company's new power-house at Long Island City and from thence to the Electrical Testing Laboratories in New York; the other was to Chrome, N. J., where the works of the United States Metals Refining Company were inspected. In the evening a "Smoker" was tendered the society by the Chemists' Club.

Only a few of the papers which were read during the technical sessions were of special electrical interest, the others being largely chemical.

Dr. J. W. Richards gave an excellent digest of the Canadian experiments with the electric furnace for smelting iron ores. These experiments were conducted at Sault Ste. Marie under the direction of Dr. E. Haanel, and a long report has been issued of this work, but it is difficult to extract from it the valuable information there contained, without a good deal of labor. This has been done by Dr. Richards, who not only discussed each important experiment, but pointed out the reason for its comparative success or failure. One pointed criticism was the constant attempt to secure gray pig iron, which was not necessary. At the beginning of the experiments, the power required to produce a ton of iron was about 0.35 horse-power-year, but as experience was gained this was reduced to about one-quarter of a horse-power a year. One difficulty experienced was the heating of the charge so that it became conducting and shunted the current around the arc. The charge also became sticky at the top and clogged up the furnace at times, making it necessary to shut down. In the first attempts, too much carbon was added to the charge and better results were obtained as the quantity was decreased. It was found that briquets of carbon gave better results than coke, as they were less conducting, and that charcoal was also good. When the furnace clogged, an attempt to clear it by blowing air was tried but was a failure.

The general conclusion is that for successful smelting in the electric furnace the greatest care must be exercised in mixing the charge of ore, lime and carbon in the proper proportions, and that even in the best of the Canadian experiments too much carbon was used.

Another paper of exceptional value and much theoretical interest was presented by Dr. Henry Noel Potter. Dr. Potter really presented three papers. The first was entitled "Silicon Monoxide." This paper was chiefly of chemical interest and constitutes a notable contribution to that science. Theory indicates that silicon should form a monoxide, as does carbon, but previous attempts to isolate this compound have been failures. By means of the electric furnace, in which carbon and silicon dioxide—sand—were mixed in the proper proportions and heated, a violent reaction takes place and the materials are volatilized. If slowly cooled, a mixture of silica, or silicon dioxide results, but when the cooling is rapid a light voluminous brown substance results, which was assumed to be the monoxide, and Dr. Potter described in considerable detail the very exhaustive tests made to prove this. They seem to be conclusive.

The second paper by Dr. Potter described the technical uses of this new material which has been christened "Monox." It seems to be in an exceedingly finely divided condition, and has a silky feel, and although the specific gravity is not low it is so voluminous that it seems very light. It is a non-conductor, and excellent for mixing with paints, seeming to have a covering power better than that of zinc oxide or white lead. Due to the high percentage of oil possible with such monox paints, it is durable, tough and withstands the weather. Mixed with inks it makes the ink "lay" well and dry quickly. The material becomes electrically charged from the slightest friction so that when passed through a tube it issues electrified and blown in this way against a fabric it coats the latter evenly and thus gives a layer impervious not only to all dust, but one through which bacteria can not pass. Air passed through such filters becomes sterilized. Monox may be found useful in preparing glazes. It does not seem to act beneficially when added to lubricants apparently having no effect on the lubricating quality of the oil. It was noticed, however, that after bearings lubricated with this material have run for a time, the oil could be drawn off and the bearings and journals dried and then they could be run dry apparently indifferently without heating taking place. No explanation has been found for this phenomena, but it is thought possible that the two metallic surfaces become glazed over with the hard monox.

The third paper by Dr. Potter described the furnace in which monox is prepared. An iron vessel, lined with some heat resisting material, is provided with carbon electrodes arranged so that they can be controlled mechanically, the projecting ends of the carbons being enclosed in air-tight casings. The charge of silica and carbon is then filled in around the carbons. Over the furnace is placed a large condensing chamber in which a scraper is slowly rotated. Below the chamber is a receiving chamber from which the compound can be sucked and caught in bags. The connections between the chambers enclosing the carbons and the furnace proper, and between the latter and the condensing chamber, are made air-tight by means of rubber-tube gaskets through which water is circulated, and the entire vessel is exhausted until a vacuum of about twenty-nine inches of mercury is obtained. This is done by means of a rotary air-pump, and it is found that the rubber packing was not injured by the heat of the furnace and offered a very simple method of making an air-tight, easily opened joint.

When the arc is started in the furnace, the materials are melted around the ends of electrodes and volatilized until a crater breaks through the upper layer,

and from this rushes the hot gases, but as they expand rapidly into the condensing chamber, the monoxide of silicon solidifies and collects on the sides of the condenser. The scraper removes this, and it is sucked off and caught in bags. Although it is exceedingly fine, the electrical action prevents its passage through the material of the bag. To maintain the furnace in continuous operation, it is only necessary to replace that part of the charge which has been volatilized. This can be done by firing a proper mixture down through the crater.

The generator used in this furnace is separately excited and operated at the knee of the current characteristic, so that it is self-regulating or constant watts.

Another paper of some interest was presented by Gustave Gin entitled "The Electrometallurgy of Zinc."

A paper by Henry S. Carhart and F. J. Mellencamp entitled "A Further Contribution to the Study of Concentration Cells," described the work which the authors had done in comparing the observed electromotive forces of such cells with the values calculated from the heats of dilution. The agreement was good and seemed to demonstrate the correctness of the principle.

Charles E. Baker read a paper entitled "A New Application of Chlorine in Metallurgy." This is a proposed method for treating sulphides, particularly of the precious metals, and converting them into chlorides and saving the sulphur. The point at which the electrochemists become interested is in the extracting of the metal from these chlorides and saving the chlorine, which, it is suggested, could be done electrolytically.

A paper entitled "Electroscopic Determination of Radium in Some Tufa at Hot Springs, Arkansas," presented by Herman Schlundt, contains a description of certain experiments on the deposits from these hot springs. Radium is present but seems to be in pockets and not uniformly distributed throughout the deposit.

L. H. Duschak and G. A. Hulett presented a paper entitled "Studies on the Silver Coulometer," which was read by the former. In the investigations on the standard cell, which are being carried on by Dr. Hulett, it seemed desirable to redetermine the electrochemical equivalent of silver. The apparatus used for this is a platinum dish placed within a glass cylinder to protect it, the anode is suspended from a glass tube supported by plates of glass laid over the glass cylinder. The apparatus is simple and self-contained. Experiments made by depositing on the clean platinum and on a pervious plating of silver indicated that the deposits on the platinum were in good agreement while those upon the silver were irregular. It was then undertaken to find out to what extent accuracy is influenced by impurities in the silver deposit. It was found that this contained oxygen and nitrogen, indicating that a small amount of silver nitrate was carried over with the silver. In the experiments a porous cup was placed between the two electrodes. This prevented any transfer of solid silver.

A paper by E. E. Free entitled "The Electrolytic Determination of Minute Quantities of Copper," described a method in which a spiral of thin platinum wire is used as the cathode.

Another paper of interest was presented by A. S. Cushman on the "Electrolytic Corrosion of Iron." This paper was originally presented at the summer meeting of the American Society for Testing Materials. It has been published in a bulletin of the Agricultural Department of Washington, D. C. The author from his studies of the corrosion of iron has come to the conclusion that this is an electrolytic effect. By this he does not mean simply that a chemical action takes place causing electric currents to flow. This, of course, will occur wherever conditions are suitable; but from his investigations, he is convinced that the steel and iron manufactured to-day are not homogeneous, and, therefore, difference of electrical potential will be set up between neighboring points, and this gives rise to currents which eat away the metal. To demonstrate this, he places clean samples of iron in gelatine containing potassium ferricyanide and phenol phthalein. The former substance forms Turnbulls blue wherever the metal is positive and the latter turns pink where it is negative. Mounts prepared in this way were, in which the different parts of the iron or steel were surrounded by blue and red areas.

The cause of this is attributed to an excess and a non-uniform distribution of manganese in the metal. The remedy suggested is to manufacture iron without manganese, and to secure uniformity. It was stated that one iron company has taken up this work and the product which it puts out, so far as time has made possible to determine, is less corrosive than the ordinary qualities of this metal.

The other papers which were read at this meeting were: "Electrothermic Reduction of Iron Ores," by A. E. Greene and Frank S. MacGregor; "The Metals in Order of Their Boiling Points, as Arranged from Moissan's Electric Furnace Experiments," by Oliver P. Watts; "The Heat Conductivity of Carbon," by F. A. J. FitzGerald; "Granular Carbon Resistors," by S. A. Tucker, A. Doty and R. W. Cauchois; "Electrochemical Methods for the Qualitative and Quantitative Determination of Free Silicon in the Presence of Silica, Silicates, Oxides, Free Carbon and Carborundum," by W. R. Mott; "Physico-chemical Notes on the Alkali Aluminates," by P. B. Sadtler; "Action of Ammonium Persulphates on Metals," by J. W. Turrentine; "Notes on the Use of the Capillary Electrometer for Alternating Voltages," by M. G. Floyd; "Electrolytic Separation of Silver and Copper," by H. W. Gillett; "Electrolytic Reduction of Nitric Acid," by H. E. Patten; "The Treatment of Storage Battery Elements Before Putting Them Out of Commission," by O. W. Brown and R. R. Sayers; "On the Nature of Electrolytic Conductors," by L. Kahlenberg.

Due to the limited time, most of these papers were presented either by title or in a few words only.

Illuminating Engineering Society.

A meeting of the Philadelphia section of the Illuminating Engineering Society was held on October 18, and a paper entitled "Fixture Design from the Standpoint of Illuminating Engineers," was presented by V. R. Lansingh and C. W. Heck. The same paper was presented also by the authors at the meeting of the New York section held on October 21.

In this paper a critical study is made of various styles of fixtures taken from fixture catalogues, government specifications and the authors' own designs. They point out in each case the bad and good features, and show how the design might be improved. Frequently the ceiling fixtures are too long, and, therefore, unsightly. They can be easily shortened as is shown, with a decided improvement. Wall brackets are often designed without apparent regard to interference with the distribution of light. This is particularly true of the upright fixtures. Artistically these devices are too often bad. The criterion laid down by Bassett Jones, Jr., that every fixture is an essential device intended to support a lamp, and this purpose should be evident in its design, is insisted upon. The design should always be such that it gives a feeling of restfulness and does not impress one with the idea of insecurity. It is said that if the fixture manufacturers would put a little engineering knowledge, or what might be called common sense, into their designs, that this would go a long way towards overcoming the failings of the present designs.

ELEVATORS FOR INDUSTRIAL PLANTS.

BY E. R. CARICHOFF.

For large modern industrial plants, where electricity is used for the rest of the plant, the electric elevator is the only one. The motor and hoisting gear can be placed in any location adjacent to the elevator shaft. If such space is not available it can be placed at the bottom of the shaft-way or at the top, immediately over the shaft. This flexibility of its location, as well as the possibility of bringing the power to it at a low cost, makes it more advantageous for such plants than any other.

Where electricity can not be conveniently obtained but shafting is operated near the elevator shaft, an elevator driven by belts is used. This elevator is the same as the direct-connected electric drum elevator with the motor replaced by belt pulleys, which can be connected to the shafting of the factory.

Some electric elevators are made to be placed either on the floor or on the ceiling as is most convenient. Belt machines are likewise arranged in this manner.

The electric elevators have almost entirely superseded the hydraulic elevators for industrial plants, and have many advantages over the latter. In the first place, they can be operated for about one-third the cost of the hydraulic. They have not the disadvantage of water leaking or freezing; they take up considerable less space, and do not require any special plant for their operation, as the current can be taken from any available electric power or light supply. They can be connected to the same circuit as the lights and have no effect on the latter.

The hydraulic system requires a special pumping plant, which must be in operation whenever the elevators are to be used. They make necessary the placing of large, cumbersome and intricate piping.

The electric elevator takes current approximately in proportion to the load it lifts, and has part of the load it lifts counterbalanced. In other words, they are run on the over-counterbalance system and they are very economical; the hydraulic elevator takes maximum power no matter what the load in the car may be; and as the pressure of the hydraulic system and the size of the cylinders must be arranged to lift the maximum load, and the average load is seldom more than one-third of this maximum, two-thirds of the power they consume is wasted.

The electric elevator when brought to stop, will stand at the top position indefinitely; the hydraulic elevator will not stand if there is any leakage in the system or any parts of the apparatus. This places the latter at a disadvantage in elevators for industrial establishments, where loads are constantly being taken off and put on the elevator and it is not possible to leave the operator with the car to hold it level with the floor by shifting the operating device.

In installing elevators for factories, frequently one of the requirements is that the elevator will be so arranged that it can be operated from the different floors, even though the car may not be at the floor; and also that it may be held permanently at the floor while loading or unloading material.

Where this requirement is to be met, the car is operated by means of a hand-rope running from the top to the bottom of shaft, and a safety locking device may be installed, which, by releasing a latch on the lock, after the car has been started in either direction, will automatically bring the car to a stop level with the next landing or floor.

If the car is to be used from that floor, the lock is left in the latched position and it can not be taken from that floor by pulling the hand-rope from any of the other floors. If it is desired to leave the elevator free to be called to any other floor, the lock is unfastened and the car can be moved by pulling the hand-rope. In addition to the convenience of this device, it also adds materially to the safety of the elevator, which in factory elevators, as well as in all others, is the first and most important of all considerations. The door-way openings from the landings into the elevator shaft should be protected by semi-automatic gates. These gates protect the opening to a height of about five feet, and should be arranged so that they can not be raised unless the car is opposite the landing, and so that they will automatically return, to protect the opening, when the car leaves the landing.

While the full automatic gate has been used in the past, it is dangerous. The danger with the full automatic comes from the fact that the car in its upward or downward travel, raised the gate as it approaches the floor, that is, the movement of the car automatically, at the proper time, moves the gate. This movement is liable to occur when some one is against the gate of the landing above the car.

The full automatic gate is also closed by the movement of the car, and is liable to strike any one standing in the doorway, or push them into the elevator shaft. While a semi-automatic gate and the safety locking device afford adequate safeguards when the elevator is operated by means of a hand-rope, still it would be better if factory owners could persuade themselves to adopt in all cases electric machines and complete electrical control instead of rope-controlled elevators, as these devices have almost entirely superseded hand-rope mechanical elevators for all other classes of service.

A Dynamo for Wireless Telegraphy.

A dynamo intended to take the place of induction coils in wireless telegraphy has been invented by P. Villard, who gives a brief description of its peculiarities. There are two methods at present in use in wireless telegraphy. The first is the use of an induction coil which gives periodic discharges, but the power of which is limited. The other is a transformer which has the disadvantage of wasting power when it is not useful. Mr. Villard's aim has been to design a dynamo which would develop an electromotive-force wave similar to that produced in an induction coil. He accomplishes this by winding an armature with two narrow coils only, placed diametrically opposite, and fixed. The field, revolved within the armature, carries four poles grouped in pairs. The result is that, as the field is revolved, there is an electromotive force set up of moderately high value, followed by a half-wave of double this value in the opposite direction, which in turn is followed by another low-potential half-wave. There is then a period of idleness, when the phenomena is repeated. In this way, by carrying the poles of the field across the armature rapidly, an electromotive-force wave of short duration and of high maximum value is obtained. These successive high-potential half-waves are said to be very effective in setting up electric waves.—*L'Industrie Électrique (Paris), September 25.*

Telephonic Communication Between Sydney and Melbourne.

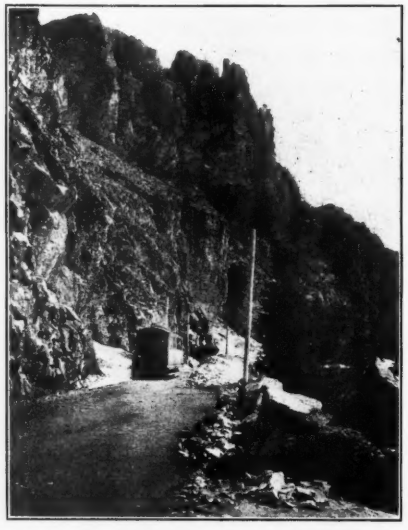
It is announced by the *Electrician*, London, that a telephone line between Melbourne and Sydney, in Australia, a distance of over 600 miles, has just been completed. Exceptionally strong and heavy copper wires, interlaced and hung for the most part on new, strong poles, are used. The cost to the Australian Commonwealth has been $233,430, of which $165,265 has been spent in New South Wales and $83,140 in Victoria. Construction progressed simultaneously in each state, and the whole undertaking was completed in less than four months.

An Electric Railway on the German-French Frontier.

By Dr. Alfred Gradenwitz.

THE electric railway recently inaugurated between Münster and the Schlucht Passage traverses one of the most beautiful valleys of the Vosges mountains, and being connected immediately to the Gérardmer-Schlucht electric railway on the French slope of the latter, constitutes (apart from the Simplon railway, the tunnel section of which is operated by electricity) what is possibly the first international electric railway line.

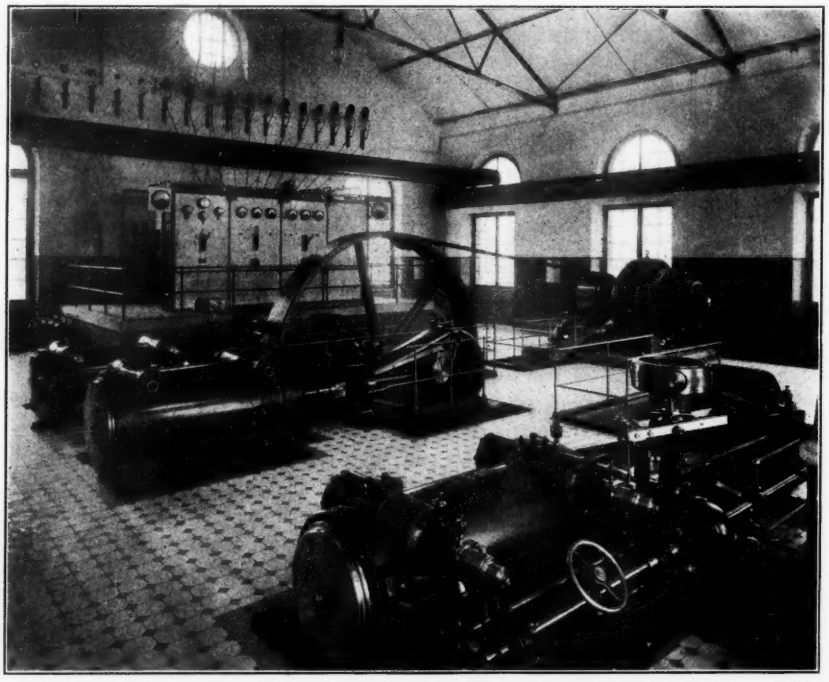
The promoters of this railway decided to combine the individual advantages of the two schemes suggested, *viz.*, an adhesion and a rack railway, by developing a mixed system which was used for the first time in the present case and which shows the advantage over pure adhesion



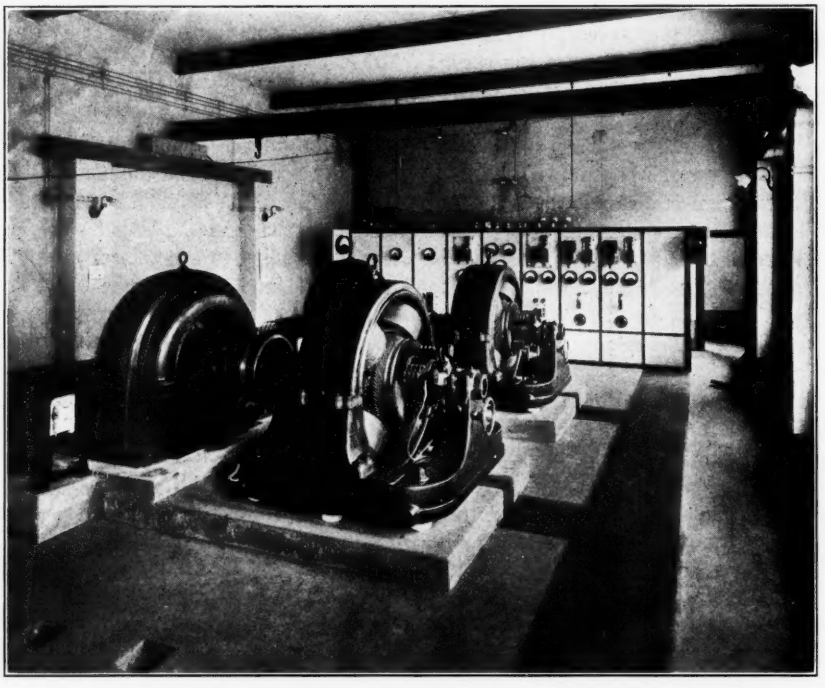
NEAR SCHLUCHT PASSAGE ON THE MÜNSTER-SCHLUCHT ELECTRIC RAILWAY.

railways of a smaller cost of construction and operation, and more satisfactory compliance with the needs of the country traversed by the railway.

From Münster for about one and three-quarters miles, the railway runs alongside the main road, while being constructed on a special roadbed from one and three-quarters to two and one-quarter miles, from which point for three and three-quarters miles (wherever the converter station is situated) the railway again follows the road which was broadened at some points. The rack section starting at a distance of about four miles, rises as far as the summit of the Altenberg with a maximum grade of twenty per cent, in order then (at five and one-half miles) again to terminate into the main road, following the latter to the Schlucht, that is as far as the French frontier. The lower adhesion section is four miles in length, the rack section one and three-quarters miles and the upper adhesion section a little over a mile in length. The minimum radius of the curves included in the adhesion section is 114 feet, and



POWER STATION AT MÜNSTER OF THE MÜNSTER-SCHLUCHT ELECTRIC RAILWAY.

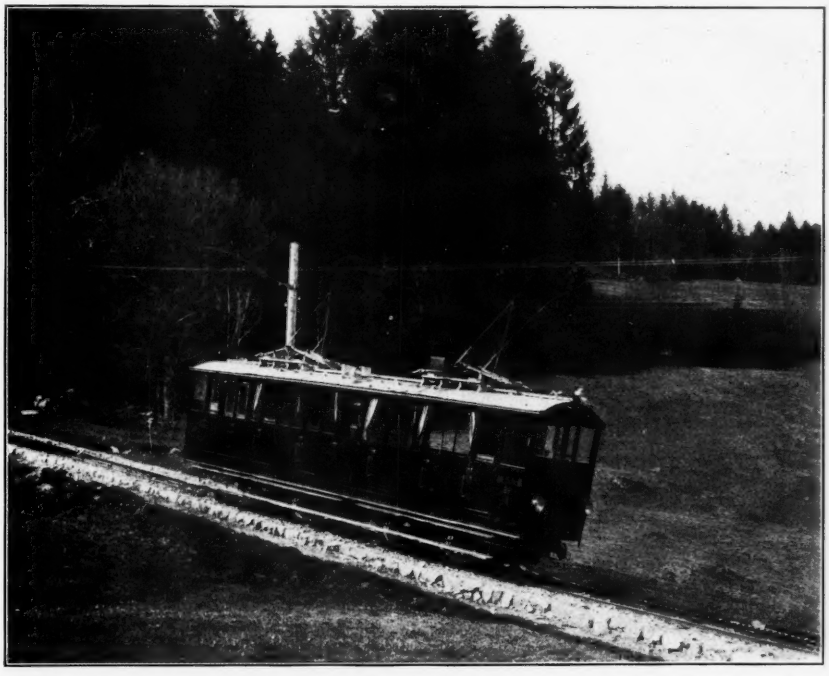


THE CONVERTER STATION, MÜNSTER-SCHLUCHT ELECTRIC RAILWAY.

in the rack section 260 feet. The station of Münster being situated at a level of 1,253 feet and Schlucht station at 3,729 feet, the level difference covered by the

THE OVERHEAD SYSTEM ON THE MÜNSTER-SCHLUCHT ELECTRIC RAILWAY.

railway is 2,476 feet. All the rails have been laid out on oak sleepers impregnated with tar oil. They are of grooved profile



THE ENTRANCE TO THE RACK SECTION OF THE MÜNSTER-SCHLUCHT ELECTRIC RAILWAY.

on the section traversing the town of Münster and of Vignole profile on the remaining portion of the line.

The rack, designed on the Strub system (which has been used for instance on the Jungfrau and Mount Vesuvius railways) is fixed on wrought-iron saddles in order to leave on the road a play of about two inches from the upper level of the rails to the wheel-teeth. The maximum total wheel-pressure is 15,400 pounds, half of which amount corresponds to each driving wheel. The rails are thirty-four feet and the rack eleven feet in length. A total of seven stoppages, including four sidings, has been provided. The power station situated at Münster comprises two horizontal compound engines driving through belt-transmission two rotary current-generators of 200 kilovolt-amperes each, at fifty cycles. These generators produce three-phase current at 7,000 volts, which, outside of the railway is used in the district of Münster for light and power purposes.

The two steam boilers installed at the power station have a heating surface of 882 square feet each, under an operating pressure of 176 pounds, and are equipped with two superheaters and one Green economizer.

The condensing pumps are installed outside of the central station and the feeding pumps inside of the latter. The power station further contains a switch-

ON THE TRANSMISSION LINE, MÜNSTER-SCHLUCHT ELECTRIC RAILWAY.

board with all necessary checking and measuring apparatus. The car-shed and repairing shop are situated immediately beside the central station, so as to reduce ineffective running to a minimum.

The electrical energy supplied to the railway is carried by conductors laid out partly on special poles and partly on the railway poles, to the converter station, in which two three-phase, direct-current converters of 200 kilowatts aggregate output are installed. The generators yield direct current at 750 volts, and a buffer battery of 390 cells and 296 ampere-hours' capacity is arranged in parallel.

The trolley wire is suspended elastically from transverse wires or brackets fixed to

wooden poles and comprises two copper wires. Owing to the satisfactory situation of the converter station, no special feeders had to be provided for. The rails, which in order to insure a satisfactory conduction have been provided with bonds, are used as return; the trolley wire itself has double insulation from the ground. Two bows are used to collect the current required for each motor-car.

An aggregate number of nine trains is to be run on week-days in summer, while as many as fifteen trains in either direction can be run on Sundays and holidays. In normal operation there are always two trains on the track, one of which is traveling up-hill and the other down-hill. During the winter, operation is to be maintained only as far as Ampfersbach with four to five daily trains, but can be extended as far as Schmelswasen on Sundays.

Each train consists of a four-axle motor-car, or of such a motor-car in conjunction with a trailer. On each axle of the motor-car is mounted a motor of eighty-five horse-power normal output and 100 horse-power maximum output; there are thus two adhesion and two rack motors. The maximum duty to be yielded by the motors is about 320 horse-power.

This joint arrangement of two rack motors and two adhesion motors on a motor-car, which was suggested and developed by the Alioth Electric Company, as above stated, forms a quite novel traction system, the same rolling stock being used on the adhesion and rack sections. On the former there are only the two adhesion motors working with simple toothed-wheel transmission, while the rack motors, being thrown out of gear, take no part in the rotation. On the rack section, however, all four motors are working, *viz.*, the rack motors with double transmission and adhesion motors in series connection with simple transmission. The four motors are operated from a single controller; they are designed both for series and parallel connection, forward and backward traveling and electric braking, any false manipulations being prevented by boltings.

Each platform comprises any instruments required for operation, that is to say an ampere-meter for the track and adhesion motors respectively, a common voltmeter and special maximum automatic switches and main fuses for the adhesion motor and traction motor circuits respectively. A lightning arrester is installed on the roof. The cars are designed for electric lighting and heating, and the motor-cars comprise the following brakes:

1. A mechanical hand-brake acting on eight blocks.

2. A toothed wheel brake acting on the axle of the rack motors.

3. An electric short-circuit brake.

4. An automatic brake which is worked as soon as the speed on the rack section exceeds six and one-quarter miles. This brake acts directly on the toothed wheel of each bogey.

The brakes can be operated from either platform. In addition to these four self-contained brakes, each motor-car comprises the following safety devices:

In order to prevent derailment, there have been suspended from the bogeys, forks surrounding the rack-head, and for further safety, laminated clutches, which, being inserted between the rack motor and the gearing, will in cases of short-circuit provide for a smooth stoppage over a certain braking distance.

One compartment of the motor-cars is provided with hinging seats with a view to its being used if required for the transport of luggage and goods.

The maximum number of passengers conveyed by each train is seventy-two. The average speed on the adhesion section is ten and one-half miles per hour, and on the rack section four and one-half miles per hour, the whole distance being covered in about one hour.

The weight of each train comprises the following items:

Motor-car without load	50,600	pounds
Weight of passengers	5,500	"
Trailer with passengers	14,300	"
Total	70,400	pounds

Comparative Economies in Operating Small Motors by Gas, Gasolene and Electricity.[1]

The smaller gas and gasolene engines require a heat input of about 14,400 British thermal units to develop a brake horse-power, of which 11,855 British thermal units are consumed in cooling, friction, etc., only 2,545 being converted into useful work, which is a loss of sixty-one per cent. The electric motor requires an input of about 820 watts to develop a brake horse-power, of which only seventy-four are loss, or ten per cent. In the larger units the results will be more favorable.

The writer has had some difficulty in arriving at a basis for calculating comparative costs on account of the various fuel consumptions at different loads. The most favorable conditions have therefore been assumed, *i. e.*, full load. Since California gas runs as a rule not less than 600 British thermal units per cubic foot, and a series of tests at a prominent technical college showed an average requirement of one pint of gasolene per brake horse-power, and it is known that 820 watts of electricity will develop a horse-power, the above quantities have been taken for the purpose of general comparison:

14,400 B. T. U. ÷ 600 =
24 cu. ft. gas per B. H. P.
1 pint gasolene per B. H. P.
820 watts of electricity per B. H. P.

Therefore, gas at seventy-five cents per 1,000 cubic feet, gasolene at eighteen cents, and electricity at 2.2 cents per kilowatt will result in equal costs of a horse-power per hour.

It is, therefore, evident that gas can compete with gasolene, as the expense of attendance, maintenance, etc., will be about equal. Neither gas nor gasolene, however, can compete with electric power at the extremely low price at which current is sold in quantity lots on the Pacific Coast to-day.

Great progress has been made during the past dozen years in gas engine construction and design, with the result that steam installations for the generation of electric current are steadily being replaced with the gas engine, which speaks well for the progress which has been made in mechanical engineering.

The following results were obtained in one of the central states where a steam plant and a gas engine plant were operated under like conditions:

The repairs on the gas engine installation during the year amounted to 0.00219 cent per kilowatt-hour generated.

The repairs on the steam plant during the same period amounted to 0.004451 cent per kilowatt-hour generated.

The cost of fuel for gas-engine plant per kilowatt-hour was 0.679 cent of the cost of fuel per kilowatt-hour with steam.

At Bradford, Pa., an electric light and power company converted its steam plant into a gas-engine plant, using natural gas at ten cents per 1,000 cubic feet. The steam plant burned natural gas under the boilers and required fifty-one cubic feet per indicated horse-power, or about eighty-six feet per kilowatt. Observation upon the gas-engine plant showed an average consumption of 21.5 cubic feet of gas per kilowatt for all loads and conditions of operation. The total cost of operating the steam plant of 500 horse-power was about $20,000, whereas, the gas-engine plant of 800 horse-power was operated at a total cost of $12,000.

The cost of installing a gas-engine plant has been found to be from twenty-five to thirty per cent greater than for a steam plant. However, the economy of the former has been clearly demonstrated by its extended use in Europe and in this country and indicates that the difficulties formerly considered insurmountable have now been fairly overcome and that the large gas engine, for certain lines of work, can no longer be dismissed from consideration.

[1] Abstracted from a paper read by L. H. Newbert before the Pacific Coast Gas Association.

The Annual Conventions of the American Street Railway Associations.

Atlantic City, N. J., the scene of the Conventions of the American Street and Interurban Railway Association, October 16, 17, 18; Engineering Association, October 14, 15, 16; Claim Agents' Association, October 14, 15, 16; Accountants' Association, October 14, 15, 16. The Appliance Exhibition of the Manufacturers' Association on the Steel Pier, October 14-18.

The American Street and Interurban Railway Association.

THE convention of the American Street and Interurban Railway Association was held October 16, 17 and 18. The first session was called to order by President John I. Beggs, at 10 A. M., October 16.

WEDNESDAY MORNING SESSION.

President Beggs introduced the Honorable F. P. Stoy, mayor of Atlantic City, who addressed the delegates briefly, commenting upon the splendid appliance exhibition, and extending the freedom of the city to the members of the association.

President Beggs thanked the mayor in behalf of the association and proceeded with the annual presidential address, saying, in part:

"Since our last annual convention your officers and executive committee have obtained commodious and admirably adapted permanent offices for the association, in the magnificent Engineering Societies Building, at 29 West Thirty-ninth street, New York. This change subjects the association to considerably increased rental but it was absolutely necessary to have larger and better adapted offices for the secretary and treasurer and for the statistical library, in order to carry on the work of the association on the broader lines contemplated for it by the adoption of our new constitution and th perfection of the organization of the affiliated associations, and I feel that the rental arranged for in the Engineering Societies Building is as reasonable as we could have obtained in any first-class building in New York city, and locates the headquarters of the association with the several engineering societies of the country.

"During the year the secretary and treasurer has more than maintained the record made during the preceding year, in the amount and value of the work turned out of his office, and it is with great pleasure that I bear testimony to his untiring energy and efficiency.

"It is gratifying to be able to report t notwithstanding the increase in the dues that all of the larger companies who are called upon for the larger amount of dues, have continued their membership in the association, and that the total membership at the close of our fiscal year, September 30, 1907, was 227, as compared with 200 at the beginning of our fiscal year October 1, 1906, and that notwithstanding the expenses of the association increased during the year to the extent of $2,991.75, the balance to the credit of the association at the beginning of the ensuing fiscal year, October 1, 1907, is $6,137.95, as against $6,976.90 twelve months previous. The associate membership in 1906 was 113; in 1907 it is 148, a gain of thirty-five.

"Passing from the business affairs of the association to that of the companies holding membership therein, it is to be earnestly regretted that we can not report more favorable conditions existing between many of the companies and the communities in which they operate; largely owing to the continued unreasonable, vindictive and demagogic attitude of many of the public officials and politicians in the various localities where our companies operate; the only stock in trade possessed by many of these officials and politicians being their unprincipled attack upon public service corporations, most of them following the examples set in higher places, but with less ability, the result being that we are passing through the most trying period that the managers and investors in these properties have ever experienced, and while I believe that this wave of unreasoning prejudice, denunciation and unwise legislation is at its crest, if it has not already commenced to recede, nevertheless it is a period when the greatest ability, courage, perseverance and patience are required to successfully withstand the abuse and attacks from all sides that are heaped upon those charged with the trying, exacting and perplexing responsibilities incident to operating public utilities at any time, but particularly in times such as we are now passing through.

"The magnitude of the business of the street, suburban and interurban electric railways of the country may be judged by the fact that at the close of the year 1906 the total capital liabilities of these companies in the United States amounted to $3,765,317,875, being an increase of practically $400,000,000 during the year 1906. The total mileage of these roads at the close of 1906 was about 36,932, an increase of 3,782 miles during the year.

"A matter of great importance and one which I do not think has been given that degree of attention which it merits by a large number of our companies or this association, is that of depreciation and amortization and I feel that it is high time that the companies recognized the vital importance of this question and took means to set aside funds to provide for the continual wear that is going on and for which no provision is being made, as it is neither proper nor practicable to make good this wear by new issues of capital; furthermore, companies having limited franchises should, in my judgment, make provisions for the repayment to the investors in the stocks and securities of these companies at the expiration of the franchises, and I have no doubt these matters will be brought home to many more of you within the next few years as they are to some of us at the present time. In connection with one of the large companies which I have managed for some ten or eleven years past, in the operation and administration of which I commenced nearly eleven years ago, setting aside a fixed amount of our gross receipts monthly—after charging to operation and maintenance current repairs and renewals—out of which has been paid extraordinary replacements and renewals. This company, in line with the general attitude of many public officials hereinbefore referred to, has been for many years subjected to the attacks of self-seeking politicians and notwithstanding we entered into a contract with the city nearly eight years ago whereby many concessions were made by the corporation to the city, in consideration of a few years' extension of the franchise, among which were the sale of twenty-five tickets for $1 or six for twenty-five cents, the granting of transfers, the free transportation of policemen and firemen, and other concessions, the city council some months ago instructed the city attorney to institute proceedings to bring about a further reduction of our fare to three cents, and in pursuance of this instruction the city attorney employed a firm of well-known public accountants to make an exhaustive examination of our books for a period of ten years from January 1, 1897, to December 31, 1906. On this work a large force of expert accountants were kept for several months and have presented to the city authorities possibly the most exhaustive report that has ever been made upon a street railway company in this country. Among other things they say 'we found the books and records of the company to have been kept with unusual skill and accuracy and we were accorded at the hands of the company every courtesy which would facilitate our work and we are pleased to give here an expression of our appreciation of the consideration shown us. The attitude of the management in this respect is creditable, in view of the fact that our visitation was not at the instance of the company nor was our work presumed to be for its benefit.' They further state that 'it is proper at this point in our report to observe that from the standpoint of the stockholder the books disclose results which mark the management of this company as being of uncommon capacity. From the same standpoint there is little left to be desired since in addition to the payment of good dividends the property has been so well kept up that it probably is in better condition at the end of each year than ever before, while ample reserves have been accumulated with which to meet every contingency which may reasonably be expected to arise in the conduct of the business. The standpoint from which we view the matter, however, is essentially different from that of the stockholder, since the interest of the public, represented in this inquiry by the city government, is not necessarily conserved by large returns to the stockholders but is centered in the question of how cheaply may good service be given.'

"These expert accountants, acting for the city, and looking at the matter purely from an accounting point of view, and having no experience as to the operation of electric railways, practically take the position that we are not justified in creating the reserve funds which I know is absolutely necessary to properly maintain and keep up the property and to provide for the demands which are inseparable from the proper administration of this character of properties, as for instance, by careful and close management, which the accountants denominate as of 'uncommon capacity,' and a familiarity with the fire insurance business, I felt that it was good policy to charge a small percentage—

one per cent of our gross receipts monthly —to operation, and carry it to a fire insurance reserve fund, out of which all fire insurance premiums and losses not covered by insurance have been paid, the balance being invested in interest bearing securities, with the result that at the present time we have in this fund $450,000 of first-class five per cent bonds—interest on which is likewise credited to the fund. And it is unnecessary to state to you gentlemen, who are experienced in placing fire insurance on these properties, how much influence the fact that we have this invested fund has upon the rate we are accorded by the old line fire insurance companies. This charge against operation the expert accountants think was unnecessary, and propose to credit it back to net earnings. They likewise attack and propose to carry back to net earnings an amount of $350,000 that we have invested in first-class five per cent bonds to the credit of injuries and damages reserve, this fund having been accumulated out of a maximum charge of four per cent of our gross receipts; for several years of my operation of the property the amount charged against operation and carried to the credit of injuries and damages reserve only having been three per cent. This amount it is likewise argued by the accountants should be credited to net earnings, all for the purpose of showing that the company might have been operated for so much less money as to have permitted a fair dividend to have been paid upon the capital of the company and yet a lower rate of fare granted.

"The absurdity of this will be evident to any manager of a large company who knows how long it would require to settle up and the amount of money necessary to pay for the injuries and damages that are hanging over these large companies and which could not under any circumstances be settled in any reasonable manner in a less period than from five to seven years, and I have claimed that these companies should be so administered that if they were to go into liquidation at any time, they should have a fund created from month to month as accidents occur, which would approximately pay for all amounts that might be required to discharge all claims pending against the company for injuries or damages either to person or property. I feel very sure that when these matters are properly presented to a court of equity, the position of the company will be maintained, and if the expert accountants should be present, they will acquire some knowledge and experience that can not be obtained in an accounting office or simply computing columns of figures. This I say with all due respect to the profession of public accountants."

The report of the executive committee was presented, and, after an explanation by Mr. Beggs of the proposal to establish a permanent place of meeting, was approved, after which the presidents of the affiliated associations addressed the meeting. C. L. S. Tingley, president of the Accountants' association; H. H. Adams, president of the Engineering association, H. C. Bradley, acting president of the Claim Agents' association, and James H. McGraw, president of the Manufacturers' association.

The roll of new member companies was then read, and the following amendment to the by-laws was offered by C. D. Wyman: "That paragraph (*a*) of Article VI of the By-Laws of the American Street and Interurban Railway Association be amended to read as follows: 'The entire charge and management of the affairs of the association shall be in the hands of the executive committee, which shall consist of the president, the vice-president, and one member appointed by each affiliated association, and all the past-presidents of the American Street and Interurban Railway Association and its predecessor, the American Street Railway Association, these past-presidents to be honorary members of the executive committee, but without power to vote at the meetings of the committee. The executive committee shall make arrangements for carrying out the objects of the association.'" This amendment was placed in motion and carried without discussion.

Richard McCulloch, chairman of the committee on "Subjects," presented a brief report.

The report of the committee on "Car Wiring" was presented by John W. Corning, chairman.

The Committee on Car Wiring, in its report, showed that the following rules of the National Electrical Code had been modified to the advantage of street railway companies; rule 28, section B; rule 33, section C; rule 33, section E. These modifications permit of a more liberal application of the rules to street railway property than in their originally approved form.

The report suggests a change in rule 32, section F (lighting and lighting circuits), as follows: clause reading, "no lamp of over thirty-two candle-power to be used," to be changed to read, "no lamp consuming more than 128 watts of energy to be used." This change is suggested as it was evidently the purpose of the old rule to limit the energy consumption through a single outlet rather than the quantity of illumination.

There are two suggestions, which, from their nature call for more radical changes in the rules than could be approved by the Electrical Committee without the sanction of the Underwriters' Association in annual meeting. The first relates to rule 32, section G, paragraph 2 (heaters and heater circuits), and calls for its modification in such a manner as to allow the use of a truss plank heater by providing a thickness of three-sixteenths inch of approved fire-resisting insulating material between the back of the heater and the truss plank. The second suggestion refers to rule 33, section E, paragraph 3 (car houses), which requires bonding of all rail joints to have a capacity at least equivalent to No. 00 B. & S. gauge copper wire, and it is suggested that No. 0 B. & S. gauge should be large enough and might reasonably be specified.

At this stage W. Caryl Ely made the point that this committee had been of great benefit to the association, particularly to the smaller member companies, indicating the wisdom of the present system of organization.

The report of the committee on "Standardization of Equipment," H. C. Page, chairman, was presented. This report was approved and on motion adopted as a standard for the guidance of the member companies.

The paper by Professor H. H. Norris, entitled "The Technically Trained Man and the Electrical Railway Profession," was read.

Professor Norris, from his observations, concludes that technical graduates are favorably regarded by the officers of railway companies. It is surprising that such a comparatively small number of technical graduates find their way into the electric railway business. Of those graduates who have become engaged in this line, quite a proportion are in the supply business, and only a small number are actually in the field. This is probably not because railway work is not attractive, but other lines have been so much easier to enter that they have attracted the bulk of the graduates. He suggests the following arrangement for a one-and-one-half-year apprenticeship course: (1) three months in master mechanic's department; (2) one month in purchasing agent's department; (3) three months in motive power department; (4) two months in transportation department; (5) two months on outside line work; (6) three months in way department; (7) two months in comptroller's office; (8) two months in general manager's office.

Henry W. Blake called attention to the number of schools offering courses in electrical engineering, and raised the question as to whether the electric railway companies were prepared to utilize the service of these specially trained men. Other industries are absorbing them, apparently as fast as they are turned out. The paper by Professor Norris suggests a concrete plan by which the results secured by other companies in utilizing college graduates may be possible for the railway companies. The establishment of a trained force of men should be of great future assistance to the railway companies.

This paper was discussed also by Professor Richards, of Worcester Polytechnic Institute, and by C. S. Sergeant, both

of whom were in favor of the apprenticeship course.

The report of the committee on "National Fire Protection" was presented by Ralph Sweetland, of Boston, Mass.

The National Fire Protection Association, as its name implies, is an association whose object is to promote the science and improve the methods of fire protection. It was organized in 1896 by men connected with stock fire insurance companies in an attempt to unify requirements for construction in new and old buildings, installation of automatic sprinklers and other fire appliances. It was soon seen, however, that if the association was to accomplish its mission, not only the underwriters but all national bodies having primary jurisdiction must be included in its membership. To that end, in 1904, its constitution was changed so that it now has as active members, the American Institute of Architects, the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, American Street and Interurban Railway Association, American Water Works Association, National Board of Fire Underwriters and practically every insurance organization of importance throughout this country and Canada.

Its work might be described as the preparation of standards for so-called fireproof or fire-resistive construction, slow-burning construction and correction of buildings of inferior construction, especially as regards resisting the action of fire; standards for fire doors and fire shutters and wired glass windows; standards for construction and installation of all fire-fighting appliances and apparatus, such as the automatic sprinkler; steam, rotary, centrifugal or electric fire pumps; hydrants, hydrant houses, hose, play pipes; chemical fire extinguishers; standards for signaling systems used for the transmission of signals affecting the fire hazard, such as thermostats, journal alarms, watchman's time-recording apparatus and automatic sprinkler alarms; standards for the construction of ash cans, waste cans, safety cans for benzine, gasolene, etc.

The paper by H. T. Campion and William McClellan, entitled "The Influence of the Design of Railway Structure on Economy of Operation," was read by title, after which the session adjourned.

THURSDAY MORNING SESSION.

The first order of business was the appointment of a nominating committee, as follows: W. Caryl Ely, chairman; C. S. Sergeant, Boston, A. E. Lang, Toledo, and any other past-presidents present at the session.

The report of the Committee on Rules for the Government of Motormen and Conductors was presented by E. G. Connette, Worcester, chairman, as follows:

Your Committee on Standard Code of Rules respectfully reports that data sheet No. 18 was sent out to the various members of the association, as well as to companies which are not members, asking for the following information:

1. Company.
2. City.
3. State.
4. Urban or interurban system.
5. Have you read the report of the Standard Rules Committee which was submitted to the convention at Columbus, Ohio, October, 1906?
6. If so, have you adopted these rules as standard on your lines?
7. If you have not adopted these rules as standard, would you kindly give the committee your reason for not doing so?
8. If you have not read the report of the committee, will you please send for a copy of the report to the secretary of the association?
9. Have you any suggestions for the consideration of the committee relative to the report submitted at Columbus?
10. Remarks.

A large number of these data sheets were filled out and returned, and your committee are pleased to report that a large number of the members of this association have adopted the standard rules, with such additions as local conditions required. A few companies have used the standard rules as a basis, but have not followed the recommendations of the committee in regard to preserving the integrity of the numbers, etc., as recommended in the report submitted at the Columbus convention. Three of the larger companies report that they have not adopted the standard rules; one of which does not give any reason. Another gives as a reason that they have their own book of rules. Another says that they have a supply of rule books on hand and consider that their rules are suitable to local conditions, but that they favor standard rules as far as practical. Another company reports that they have not adopted the rules, because they do not provide for a joint use of tracks by steam and electric trains. This, of course, is an unusual condition, which the committee has not yet considered.

Very few suggestions have been submitted for consideration. The committee, therefore, can only report progress as to further recommendations and that the matters now under consideration be taken up by the committee for the ensuing year.

Mr. Connette added that one company controlling a large number of properties has its own book of rules, and another holding company controlling perhaps six or eight different properties, members of the association, has adopted its own book of rules. The Central Electric Railway Association has taken the Engineering association's book of standard rules practically as a basis for its rules, and has used them as far as it saw fit, but it has gotten up a book of its own, claiming that there are a great many conditions existing with its companies which the book of rules does not cover. The New York State Street Railway Association has practically adopted these standard rules, and they are in effect in nearly all the cities in the state of New York. It seemed to him that the work of this committee perhaps for the ensuing year would be to make an effort to have a conference with representatives of these two companies referred to, and also with the representatives from the Central Electric Railway Association, and see if there is not some ground upon which a conclusion that will result in one book of rules for the use of all these different companies can be reached.

The paper entitled "Light Freight Handling by Electric Lines," by P. P. Crafts, general manager Iowa & Illinois Railway Company, Clinton, Ia., and general manager Joplin & Pittsburg Railway Company, Pittsburg, Kan., was read.

Mr. Crafts also said that the reduction of twenty per cent in tariff has resulted in a very appreciable increase in the amount of freight carried, and it has greatly overcome the reduction in rate.

Mr. Crafts states in his paper that where parallel steam competition exists, interurban managers should not be discouraged, for shippers will favor the road which gives them good passenger service, provided, of course, rates are equalized and proper attention given to that branch of the business. Generally speaking, it is a mistake to assume the position that freight will be carried only as an accommodation to patrons, and then charge an exorbitant rate, or neglect to ship promptly, or to take proper care of the shipment after its arrival at its destination. On the other hand, many managers, in their anxiety to build up a profitable business, have overloaded their roads with expensive handling facilities, such as costly freight depots, intricate accounting systems, free team deliveries, etc., which have eaten the profits that might otherwise have been realized. For that reason it is sometimes a mistake to charge a higher tariff on passenger cars than is charged on freight trains. Rather, say to the shipper that you will handle his small rush shipments on passenger cars when possible at the regular rate, as an accommodation, so long as he confines

himself to the freight trains as far as possible.

Interurban freight traffic may be properly divided into the following classes: 1—strictly light packages transported only in baggage rooms of passenger coaches at express rates or at a fixed charge per package or per 100 pounds, regardless of class, and generally termed express business; 2—less than carload freight transported on fast baggage cars at regular freight or special tariffs under regular or special classifications, generally the former; 3—a combination of class 2 and the haulage of a few carload shipments daily at regular tariffs and classification; 4—regular carload freight hauled by steam or heavy electric freight locomotives at regular tariffs and classifications, or any combination of the abovementioned classes. The profits of such a business depend largely upon the opportunity of the management to secure combined freight and passenger depots at the terminals and in the larger local towns. Generally speaking, the margin of profit is close, and only careful management will produce a profit, particularly during the first few months after the business is started. A recent ruling by the Iowa railway commission reduces the tariff on two locals twenty per cent. The percentage which earnings from freight traffic bear to the total gross earnings depends largely upon local conditions, but of those roads which have favored the author with statistics, the earnings vary from five to approximately forty per cent of the total gross. Interurbans which handle carload business in addition to the traffic of which this paper treats, in some cases enjoy gross earnings from freight exceeding those derived from passenger traffic. The author believes that satisfactory results are being obtained and predicts that the average interurban railway, the existence of which is warranted by prospective passenger traffic, can be assured of a profitable freight business, which, within a few years, will become an important factor in its earnings.

The paper entitled "Freight Service on Electric Railroads," by H. H. Polk, was read.

Mr. Polk gives a number of reasons why freight service on electric roads should be practicable. Figures are also given from the report of the Inter-Urban Railway Company for the year ended June 30, showing statistics on freight. The total freight carried amounted to 82,403 tons, at an average rate of $0.6392 per ton. The freight revenue was $52,675.03. Mr. Polk considers that an electric railroad, in order to do a general railroad business, must be equipped to properly and promptly handle any business given to it. The freight department should be in charge of a general freight agent. In large cities a good solicitor should constantly be at work, keeping in touch with the freight situation. This solicitor, besides securing business for the company, should find a market for the products of the farm, such as dairy products, poultry, fruit and vegetables. The general form of steam railroad accounting should be adopted. A centrally located commodious freight house convenient to the wholesale houses should be installed. Each of the stations along the line should have a freight room in charge of the station agent. At all stations or sidetracks shippers should be encouraged by the company. The rolling stock should be modern, the electric locomotives equipped with motors of sufficient capacity to handle trains of at least one to fifteen cars at a speed of at least twenty miles an hour or better. The small or less than carload shipments should be handled in express cars equipped with motors of at least the same capacity as the passenger cars.

C. Loomis Allen said that his observations, and the standpoint from which he had viewed this matter, have been to the contrary of the views presented in the paper. He thought that in New York state, of the roads that are transacting an electric express or freight business, the majority of them are transacting that business at the expense of the regular passenger business. He believed that for every dollar they are putting in they are only taking out ninety cents. That is a pretty broad statement to make, but I believe when the accounts are analyzed, when the proper charges have been made, to the cost of conducting this department, that these results have been produced in the past.

C. D. Emmons, of Fort Wayne, Ind., said that the experience of his company had not been quite as disastrous as that described by Mr. Allen. It must be realized in starting out in a business of this kind that it is a business which must be developed and which must grow. His company has been in the business for the past two years, and has had to increase facilities largely. They started in with earnings from $5 to $10 a day for running a car a short time, until at the present time the receipts of freight cars in service are averaging between $75 and $100 a day for ten hours' service. Last year's expense account, in which has been itemized the investment, proportion of track labor, and everything, according to the mileage of the cars, shows, not as low as the paper states here, seven per cent, but about sixty per cent of the gross receipts from the business. They have recently been forced on account of business presented to them to attach a trailer car, and they feel by the development of the trailer business they will reduce the percentage of operating expenses; in their territory they feel that it is a large factor in the development of their properties, especially in the lines presented in the paper—the farmers along the line are beginning to ask for sidings, to get coal in, to ship cattle, and in that way it is felt that a large development will be made.

J. H. Pardee believed that if the electric railway operating the freight service is in competition with good service on a steam road, that the electric railway is at a great disadvantage in competing for heavy and bulky and carload freight. There are exceptional conditions under which that kind of freight can be hauled at a very handsome profit, but he thinks those are individual cases and can not be covered by any general rule. The steam railroad hauls freight in comparatively inexpensive cars in which they have not a large investment, and the electric railroad attempts to compete with the steam railroads and haul the freight in a car costing at least seven or eight times as much; so that if the interest on the investment and the depreciation of these cars in which this heavy freight is hauled is looked at, some of the operating reports will have to be corrected.

He believes there is a profit in the express business, and that the profit depends very largely upon the classification and that the classification of the steam roads and of the old line express companies should not be followed, but that each road or each class of road operating under similar conditions must work out their own salvation in its classification, and if that is properly worked out, then there is money in it.

George W. Parker said that the Detroit United Railway system had been in the electric express business since 1891. At first they adopted tariffs along steam railroad lines, but as experience in the handling of freight and express broadened, changes were made in those tariffs. They have finally gotten to the point where they give attention more particularly to the high-class traffic, excepting the low-class traffic. For instance, the steam railroad rate for household goods is first class. The electric railway has gone to second class, and now they are going third class and fourth class, and so on down the line. With heavy traffic the same thing has been done and they have fixed a minimum charge. On some of the properties he knows that it has been a profitable thing to do, and on other of the properties it has not been so profitable. He is firmly convinced on one piece of property, where the freight rates are very low, the mileage from Detroit to a given point being seventy-six miles, that it will not be possible to continue this business as a freight proposition. They are operating three cars a day between these given points and each car, in addi-

tion to paying a revenue to the city of $1 per car per round trip, is hauling freight of a class which it has been concluded is not profitable. These cars have to be operated in order to carry baggage. He believed that if freight was exempted from that road, or even still further, if the rate was higher than is now in effect on the steam roads, a higher class of business would be secured on the service now given and some money made out of it. Between these two points there is water competition, on which the rates are lower than the electric railway has in effect, but they manage to get the business just the same. On this proposition they are up against the fact that at the terminal end they have to pay tribute to the road on which they run to this point, which is made on a mileage basis, and in addition to that they have to join in the expense of freight terminals, separate baggage room, separate ticket offices, etc., and consequently there is nothing left for revenue to amount to anything. On short-haul business he is in favor of the freight rates, and it pays. When it comes to long hauls, he tries to strike a conservative policy, if possible to do it; not going below the steam railroad rates, but trying to go above them, because just as soon as the steam railroad rate is reached a volume of business is secured which can not be taken care of without increasing the service.

W. S. Dimmock said he had in service between 300 and 400 freight cars, operating some twelve to fourteen freight trains per day. Some of those trains haul as high as 700 and 800 tons per train, at a speed of fifteen to eighteen miles per hour. Other lines are operated in single units, or with cars that are equipped with motors and are not run as a train. The amount of business handled has increased so fast that they could use about 200 more cars to take care of it. It has grown so heavy that the state commissioners have now considered that they are on a par with steam railroads as to the business carried and the importance of it, and placed them under their wing, as well as the Interstate Commerce Commission. They are carrying between Seattle and Tacoma some 2,000 to 3,000 gallons of milk which is picked up through the valley and taken into Seattle each morning on a special train. They have two or three trains per day of ten or twelve cars of coal—60,000-pounds-capacity cars—pulled with a locomotive or an ordinary box-car type of car, G-66 motors, four of them, at 125 horsepower each. They also have a refrigerator line. They are fortunate in having some packing-houses located in Seattle and some in Tacoma, where each one of them desires to ship their product to the other cities, so they get the freight both going and coming. In addition to this, they operate two local freight trains out of each city per day, and they have all the business both in carload lots and local freight that they can possibly handle. They find that the expense of this freight will run about forty-five or forty-eight per cent, probably fifty to fifty-two per cent, including the depreciation of the cars. They can get very desirable flat cars for anywhere from $450 to $550 delivered on the coast. They have also some twelve miles of sidings on the suburban lines, where they are hauling lumber in trains of five and six cars, in many places over five and six per cent grade, which bring in a very handsome revenue. They are handling an average of $20,000 of freight business gross per annum. In addition to the wood business the local freight—small package freight—is increasing very materially, and upon one line which was about seven miles long, where they had never done any business at all, the traffic manager insisted that he thought a business could be built up in that locality. At the end of one year one freight car is running upon that line constantly daily, and they are thinking of putting on the second one, the local package freight being so heavy that it is impossible to take care of it, and this upon a line where it was impossible to see any business at all when started.

Mr. Crafts asked Mr. Dimmock whether he had steam railroad competition.

Mr. Dimmock replied that there were two lines paralleling his line between Seattle and Tacoma, and a heavy competition on the boats.

Mr. Crafts asked whether the operation of freight trains interfere in any manner with passenger traffic.

Mr. Dimmock replied negatively and stated that they dispatched trains under the standard rules of steam roads, telegraph operators and station agents. The total operating expense of handling this freight, which does not in any way interfere with passenger traffic, will run somewhere between forty-five and fifty per cent. Speaking of the passenger traffic being interfered with, he said that they have trains operating between Seattle and Tacoma every hour, both ways, and at a speed of sixty-five miles per hour, where out of thirty-six miles they have sixteen or eighteen miles of double track, and the balance single. The most of the freight business is done at night.

It was moved that a committee be appointed to take up the matter of getting a classification on freights that will meet the requirements of the Interstate Commerce Commission, to report at the next meeting, the matter to be handled by the accounting committee. This motion was carried unanimously.

The next paper, entitled "The Department of Publicity," by J. Harvey White, publicity manager Boston Elevated Railway Company, in the absence of Mr. White, was read by H. W. Blake.

No one, says Mr. Harvey, in his paper, who participates in the larger responsibilities of street railway management needs evidence outside of his experience as to the power of public opinion or as to the importance of securing and holding the public good will. The reason that the public so often fails to give full credit where credit is due is not because the public is constitutionally unfair, but because it is uninformed or misinformed. To overcome this defect, to eliminate unfairness and hostility based on ignorance or misinformation is the function of a department of publicity, and the extent to which this is accomplished is a fair measure of the department's efficiency. Responsibility for criticism and opposition based upon real facts must be borne by the general management, but responsibility for hostility and unfairness based upon public ignorance must be borne by the department of publicity if it is authorized to make the real facts known.

If those whose duty it is to gather news learn from experience that all reasonable information is truthfully and promptly supplied to them and that it is only in rare cases that their requests are denied, they will learn to depend upon the company, as they ought to be able, for their news, and the stories that get into print will be more accurate and most satisfactory to both the publisher and the corporation.

The equipment of a department for publicity work need not be elaborate. One man with a telephone connected with all of the departments and stations, a desk and a few chairs for the use of reporters can accomplish considerable valuable work. A large company will require a somewhat more extensive outfit. The writer of this paper is provided with two offices; a private office for himself, and a general office for a stenographer and clerk. Each office has a telephone. There is a small library, a collection of maps and plans, files for clippings, documents, memoranda and correspondence. These offices are open from nine to five on business days. During the other hours of the day and night and on holidays and Sundays a clerk, to whom all accident reports are made as soon as possible after their occurrence, is on duty and gives information to the newspapers.

Another paper upon this subject, by E. W. Warnock, general passenger agent Twin City Railway Company, Minneapolis and St. Paul, was also read.

Mr. Warnock's paper described the publicity work of the Twin City Rapid Transit Company, Minneapolis, Minn.

The report of the committee on "Promotion of Traffic," W. E. Harrington,

chairman, which was along the same lines as the two previous papers, was read.

There being no discussion the next paper, entitled "Problems of the Small Electric Road," by H. S. Cooper, manager Galveston Electric Company, Galveston, Tex., was presented by F. C. Randall, assistant manager of the Galveston Electric Company.

Mr. Cooper emphasizes the necessity for some form of organization of the working force, even of the smallest electric roads. He shows the relation of the manager to the various departments and indicates the necessity for the manager of the small roads to assume larger proportions if he is to grow and see his road expand.

FRIDAY MORNING SESSION.

The first business was the appointment of a Committee on Resolutions, as follows: C. D. Wyman, Seattle; H. G. Davies, Cleveland; C. S. Sergeant, Boston.

The report of the Committee on Insurance was presented by H. G. Davies, of the Cleveland Electric Railway Company, chairman.

The seventy-odd reports received by the insurance committee show insurance premiums amounting to more than $3,000,000, losses of $1,482,600, and payments by the insurance companies of $1,360,000 in adjustment of the losses, or forty-five per cent of the premiums paid, indicating that, while rates on many large properties have been reduced, there is still considerable profit in the business.

A large part of the cost of conducting the insurance business consists of commissions paid to agents, brokers and solicitors. It is evident from these figures that if this item of expense could be eliminated, either by cooperation among traction companies to mutually insure their own properties, or by arrangement with existing insurance companies to do the business directly with the traction companies without the intervention of middlemen, a substantial additional saving in premiums might be obtained.

Of course, if full reports had been received from all the members of the Association, the ratio of loss to premiums might have been greater. On the other hand, it might have been smaller. Some of the companies that reported gave figures for only a part of the period called for by the blank. If even these companies had made a full report for each of the seven years, the result indicated might have been changed. It may be that all the losses suffered by these companies are not included in their reports; but the large losses suffered by the Baltimore, Cleveland and St. Louis companies within that period are included, and these three losses alone amounted to more than $800,000.

Some of the companies reporting are setting aside from their earnings an insurance reserve or fund, in lieu of insurance or in addition to insurance. The amounts so set aside are not included in the premiums on which the foregoing calculations are based. If they were included, the percentage of loss would be smaller.

The reports show that the causes of fires have been various—some from lightning, some from defective wiring, some from short-circuits in cars, some from electric heaters, one from the upsetting of a car-stove caused by the derailment of a car, one from placing wet horse-blankets in an armature-oven to dry, and others from other causes. Most of the fires started in cars, and a large proportion of the car-fires occurred in cars in service on the road. Several of the fires reported occurred in theatres or other park properties, and one was in a storage warehouse owned, but not occupied, by the street-railway company that reported the fire. The losses from these fires are included in our statement of losses, although the properties destroyed or damaged were not, strictly speaking, street-railway properties.

The action of the stock companies since you began the consideration of the subject of insurance, three years ago, in reducing rates, especially to the companies that have been most active in forming organizations for mutual insurance at cost, indicates, first, the effectiveness of the work of your committee, and, secondly, a determination on the part of the old-line companies to retain the business of the traction companies, even if they have to do some of it at a loss. This is emphasized by their statement to your committee that rates ridiculously low—so low as to show no possibility of profit—have been made to certain street railway companies. Their purpose in making these low rates was to prevent those companies from carrying their own insurance, or from uniting with other companies for mutual insurance at cost.

The mutual-insurance plan recommended by your insurance committee has been favorably considered by the Central Electric Railway Association, the National Electric Light Association and the Association of Edison Illuminating Companies, each of which has appointed an insurance committee, with duties similar to those devolving upon this committee.

President Beggs desired to emphasize the great importance of the matter of insurance to most of the companies. He described the fire insurance reserve fund which had been established for the traction companies in Milwaukee, and stated that this reserve fund had been a means of very materially reducing the rate for insurance on traction properties in that city. Mr. Beggs also called attention to the necessity for the closest kind of inspection, as it was where a fire was least expected that many times the greatest hazard existed.

H. N. Staats spoke of the progress which had been made in organizing the American Railway Insurance Company, the Electric Mutual Insurance Company and the Traction Mutual Insurance Company. He emphasized the fact that insurance is a fixed charge, and claimed that it could be done better through the traction company's own organization than through an organization of companies whose interest it was to make the largest amount of money possible out of the capital invested.

The report of the Committee on Rules for the Construction of Modern Car Houses was presented by E. J. Cook.

The committee report stated, as a primary consideration, that a standard railway-car storage house should be so constructed and protected that it may not contribute in any manner toward the spread of fire therein, and contribute only, in case of fire, not to exceed sectional losses of the structure. One single division should not exceed dimensions to expose to any one fire a greater number of cars therein than would represent a valuation of $200,000 of combustible rolling stock, or a total interior trackage of not more than 1,800 feet. The report was divided into sections, taking into consideration the walls, height, area, roof and roof supports, skylights and ventilators, cornice, finish, floors, pits, tracks, track doors, hazards, exposures, reinforced concrete or concrete-steel-constructed building. The rules and requirements for the installation of automatic-sprinkler equipments in railway-car storage houses, as recommended by the National Fire Protection Association, are also included in the report.

Mr. Staats said he thought it would be to the benefit of all the members of the association if they would adhere to the rules and specifications indicated in the report, and moved its adoption.

Ralph Sweetland also emphasized the importance of the report, and said he hoped the association would endorse the committee's work.

The report of the Committee on Municipal Ownership was presented by C. D. Wyman, chairman. This report elicited considerable discussion by A. E. Lang, General G. H. Harries, President Beggs and C. D. Wyman. Following the discussion, it was moved and seconded that the report of the committee be accepted, the motion being carried unanimously.

A. T. Bell, president of the Atlantic City Hotel Men's Association, then brought up the question of the association's guaranteeing a meeting at Atlantic City and the utilization of the steel pier

for exhibits for a period of five years. If the proper facilities are to be established for a permanent meeting place, Mr. Bell said it would call for the expenditure of a considerable amount of money. The money necessary would be forthcoming provided the financial plan would be agreeable to the individual exhibitors. If action were taken now favorable to the enterprise, the financial interests involved in improving the pier would go ahead along the proper lines. If unfavorable action were taken, or if action were postponed, the improvement would have to be along different lines.

A. H. Classen, of Oklahoma City, suggested that the conventions be held nearer to the centre of the United States. He thought that the conventions should be held in St. Louis or Cleveland, or some other central point. In order to bring the matter to the proper status, he moved that the whole question be referred to the executive committee, with power to act.

President Beggs put the motion, with the understanding that the executive committee would act in concert with the executive committee of the Manufacturers' association, and the motion was carried.

The report of the Committee on Heavy Electric Traction was presented by Calvert Townley. This report stated that the progress of electrification had been considerable, and the service required from electrified lines varied very widely. Owing to the rapidly developing state of the art it was as yet rather early to establish new standards, and the committee was not prepared to recommend any. The report summarized some of the more recent and more prominent electrifications, which have, however, been covered quite fully in the technical press. Much interest has been attracted to the investigation of the Pennsylvania Railroad, which is preparing to equip its New York city terminal and the tunnels connecting Manhattan Island with New Jersey and with Long Island with electricity. For the purposes of demonstrating the various possibilities open to it, the company has arranged to test both large continuous-current and alternating-current locomotives, that comprising the greatest novelty being a 152-ton, fifteen-cycle, single-phase, alternating-current locomotive for operation from an 11,000-volt trolley feeder.

This report was approved and spread upon the minutes.

The report of the Committee on Compensation for Carrying Mail was presented by General G. H. Harries, Washington, D. C. General Harries announced that he had no formal report to make, except that the committee had succeeded in procuring legislation to increase the maximum compensation for carrying pouch mail from three to four cents per pound. At the same time, Congress has placed a very serious restriction in the law by providing that on electric railroads outside of the cities, exceeding a distance of twenty miles in length, the compensation shall not exceed the rates paid to steam railroads. This is an unfair discrimination and will cause many railway managements more or less serious distress, because the price paid must necessarily be less than the actual cost of rendering the service. He would suggest that efforts be made at the next session of Congress to secure the maximum of six cents for the pouch service and not less than twenty-five cents a car-mile on postal-car service. The twenty-mile limit should be extended to fifty miles.

The paper entitled "The Use of the T-Rail in Cities" was presented by C. Gordon Reel, vice-president of the Kingston Consolidated Railway Company, Kingston, N. Y.

In his paper Mr. Reel describes the difficulties with which his company had to contend in introducing the T-rail in Kingston. Mr. Reel is satisfied that this form of rail is far superior to the grooved girder section, as he considers the latter must be rolled in absurd dimensions to stand the wear and tear of modern electric service. In Kingston it has been demonstrated that the T-rail is very acceptable. A special form of brick is used outside the rail as well as inside.

P. P. Crafts asked Mr. Reel what the particular object was of using ninety-pound rail.

Mr. Reel replied that it was to get a more substantial structure. There would be hardly room enough with the seventy-pound rail. With the 100-pound section there was room enough for a good sand cushion between the nose of the brick and the flange of the rail.

Mr. Crafts asked if a half-inch sand cushion would be enough with a seventy-pound standard section over which seven-ton cars would operate.

F. W. Coen, of the Lake Shore Electric Railway Company, Cleveland, said that he had found the use of seventy-pound T-rails in paved streets unsatisfactory. His company had abandoned that form of construction entirely except on streets where there was little service or very light cars. With heavy cars the rail is absolutely unsatisfactory. Where nosed bricks were used, with the nose tucked under the rail, the other end of the brick turned up.

P. E. Mitchell stated that on the Knoxville Railway seventy-pound T-rail was used with a special brick with the corner hollowed off. The hollow section fits under the rail, and the bricks come in half and whole lengths, and are placed alternately. This brick leaves a small groove for the wheel flange, and the whole mass is cemented together, so that the far end of the brick can not turn up.

The paper entitled "Public Policies of the Past and Future," by C. Loomis Allen, was read by title.

The paper entitled "Interurban Railway Fares" was presented by Theodore Stebbins, of New York city.

Mr. Stebbins, in his paper, considers that the cost per car-mile of operation does not afford a direct measure of the rates that should be charged to passengers. The density of travel has a far greater influence on rates. The road must be built and furnish a service to suit the distribution and density, and the fares which can be collected follow as a consequence of this environment. The actual passenger rate per mile must be more than a car-seat cost as a maximum, in proportion as the passenger miles are less than the car-seat miles. If the passenger load averages forty per cent of the seating capacity of the car, then, on a sixty-minute headway, the average cost would be 100/40 times 0.75 cent, or one and seven-eighths cents per mile.

Before attempting to fix rates, the first thing is to study the density of the population along the line and its location—to estimate how much will be through travel; how much short-ride travel at terminals; how much loading and reloading of passengers will occur in the course of the trip; what pleasure resorts exist or may be built up; what commuter travel will be created. All of these and other elements are more vital in determining the rates of fare than a car-mile cost, trip-seat cost or the seat-mile cost. Ticket offices should be established wherever ticket sales will justify it. In the Middle West about sixty per cent of the receipts are collected through such offices.

There being no discussion on this paper, William J. Clark, New York city, presented a paper on "Municipal Ownership in Great Britain and in the United States."

Mr. Clark was given a vote of thanks and his paper ordered printed by the association.

The report of the nominating commit-

tee was then received and adopted unanimously. The officers for the ensuing year are as follows:

President—Calvin G. Goodrich, Minneapolis, Minn.

First vice-president—James F. Shaw, Boston, Mass.

Second vice-president—Arthur W. Brady, Anderson, Ind.

Third vice-president—Thomas N. McCarter, Newark, N. J.

Members of executive committee—the president, vice-presidents and Frank R. Henry, St. Louis, president of the Accountants' association; Frederick G. Simmons, president of the Engineering association; H. R. Goshorn, president of the Claim Agents' association.

W. Caryl Ely addressed the meeting, pointing out the significance of the association's securing the services of such a distinguished set of officers and executive committee.

The report of the Committee on Resolutions was then presented by C. D. Wyman. This report was in the form of a resolution tendering the thanks of the association to the Manufacturers' association, the mayor of Atlantic City, the Atlantic City Business Men's Association, the Atlantic City Hotel Men's Association, the Atlantic City Bureau of Publicity, the telephone and telegraph companies, and the technical and local press for the numberless courtesies and attentions, including the facilities for exhibiting street railway materials and appliances. The resolution also included a tender of thanks to the officers for their faithful work during the year; to the authors of papers which had been read, and to the standing and subcommittees. The report of the committee was then unanimously adopted.

Mr. Ely presented a resolution authorizing and requesting the executive committee to take such steps as may be deemed desirable to encourage the formation of an organization similar to the existing affiliated organizations, to which should be committed lines of work pertaining to transportation, traffic and general operation. This resolution was unanimously adopted.

The convention was then addressed briefly by L. T. Peck, of the Honolulu Street Railway Company, who described the system of transfers inaugurated on the Honolulu street railway system.

The convention adjourned for several minutes to await the return of Mr. Beggs, who, upon the reassembling of the meeting, heartily thanked the entire membership and the affiliated associations for their uniform courtesy and consideration during his term as president. He could not bespeak for the new officers and executive committee greater consideration or give them greater assurance of the continued successful administration of the affairs of the association than he felt could be secured from the united support of the various affiliated associations. These should become, year by year, more important.

The meeting then stood adjourned.

The American Street and Interurban Railway Engineering Association.

THE fifth annual meeting of the American Street and Interurban Railway Engineering Association was held on October 14, 15 and 16.

The first session was called to order by President H. H. Adams, on Monday afternoon at 2.40 o'clock. John I. Beggs, president of the American association, was introduced and said, in part: Prior to the time when the present plan of administering the affairs of the street and interurban railway companies was inaugurated, very much of the time of the association was taken up by discussions which are now very much more intelligibly and effectively considered in the Engineering association and through its various standing committees. This, of itself, is of very great advantage to the parent association. It has been of incalculable benefit to all the street railways of the country, whether they hold membership in the American association or not. It is unfortunate that all the companies in the country can not be brought to realize the great advantage to themselves of taking membership in these associations.

C. L. S. Tingley, president of the Accountants' association, addressed the session, followed by E. W. Olds, past-president of the Engineering association, who spoke briefly concerning some of the old-time relations of the association.

The annual address was delivered by President Adams, after which the executive committee presented its report.

The secretary's report was presented, and that of the treasurer, which showed a balance on hand of $36.58. The receipts were $1,412.66, and the expenses $1,376.08.

The report of the Committee on Control Apparatus was called for, and in lieu of this report a paper entitled "Recent Improvements in Control Apparatus for Railway Equipments" was presented by F. E. Case, of the General Electric Company.

This paper was devoted principally to a description of some of the new pieces of apparatus which have been brought out since the last meeting of the association. For some little time it has been felt that the standard form of K type series-parallel controller was not entirely satisfactory for service operating conditions. While these controllers successfully handle the ordinary arcing and currents, if a motor or other part of the equipment becomes damaged so as to take an excessive amount of current through the controller, the capacity for disrupting arcs is exceeded and short-circuits sometimes occur. The use of higher operating voltages has also imposed a greater duty upon the platform type of controller. The General Electric Company, therefore, has designed a new line of cylinder controllers with magnetic blowouts, which can be safely used where the voltage peaks may reach 750. The present line of controllers comprises three sizes: the K-34, suitable for use with either two 150-horse-power or four seventy-five-horse-power motors rated at 500 volts; the K-35, for use with either two 100-horse-power or four sixty-horse-power motors and less; the K-36, for use with two motors only of a capacity of sixty-horse-power each or less.

The K-34 and K-35 produce the bridge connections, by means of which full current is maintained through all motors during the transition from series to parallel. The acceleration of the car will therefore be smoother than with the connections where the circuit was opened or one motor was shunted, and the strain on motors and gearing will be reduced. The bridge connections, however, are not produced by the K-36 controller, as they were not considered so essential on small equipments.

The main operating handle in all sizes of these controllers is directly connected to the operating cylinder without the intervention of gearing. The reversing switch and handle are located at the left of the controllers in order to permit a better arrangement of the new style of magnetic blowout.

A number of improvements have also been made in type M controls. In order to economize space a new form of contactor in several sizes has been designed, narrower than the preceding contactors, and also simpler in construction. This

provides a heavier contact pressure than previous contactors of the same capacity, without requiring any more operative current.

A radical new design of contactor for alternating-current operation has been developed. This contactor has a very efficient magnet for operating it, and a pressure as great as that in the direct-current contactors is obtained. As a matter of fact, this contactor is just as simple in construction as the direct-current contactor, and operates with perfect freedom from the disagreeable humming incident to most alternating-current magnets.

A new electrically controlled circuit-breaker of smaller capacity than the previous one, known as the DB-105, has been developed. This is for locating under the car. This circuit-breaker may be used with either type M or cylinder platform control, and is enclosed in an iron box to protect it from wheel wash and dirt. A new fuse box known as the MA-14, having a hinged lid similar to the smaller size of MA-13, has been designed. This fuse box is made of fireproof molded insulation, instead of sheet fibre, and has been produced to overcome the difficulty in replacing a fuse. A new trolley base, known as the US-13, has been designed. It is believed that this trolley base is one which can be universally used for both high-speed and city service with excellent results.

J. W. Corning called attention to a matter of uneven acceleration on the Boston Elevated Railway due to the adjustment of the steps on the accelerating rheostat. The company was operating twenty-five box cars with two G-58 motors and K-10 controllers. It was found that on the last step in parallel, just before going into full multiple, that there was a peak of about 325 amperes on accelerating on a grade of about five per cent. The average current in multiple on that controller was a great deal larger than the average current in series per motor. By a readjustment of the resistances the company was enabled to bring the peak down to about 185 or 190 amperes. There had been a great deal of trouble on the line with flashing of motors, fuses blowing and controllers short-circuiting. Since the readjustment of the resistances the trouble had been practically wiped out.

William Roberts stated that he had an equipment of Westinghouse No. 93 controllers taking care of four sixty-five-horse-power motors, which had not been in the car barns for a year and ten months for repairs. They are operated on baggage cars fifty-two feet long, over thirteen per cent grades, carrying loads that are limited only by the size of the car. He believed that the secret of the successful operation of a road will depend on the thoroughness of the inspection of the equipment. He thought that if the superintendents of motive power and the master mechanics would go out to the shops at two or three o'clock in the morning unexpectedly, and look at the work that is being done, there would be far better operation of the equipments. Mr. Roberts has another car which is controlled by GE-57 controllers, which has no car to relieve it, and which has not been in the repair shop for two years and eight months. He appreciated the advance that is being made in controller design and manufacture, and he thinks that the railway men can do a great deal to help on the good work by watching the equipment after it is installed.

N. W. Storer, of the Westinghouse Electric and Manufacturing Company, stated that his company was still using the electropneumatic type of multiple-unit control, and is using the same contactors for both alternating current and direct current. For direct-current work the battery is used for the valve magnets, and the same battery and valve magnet apply equally well for the alternating current. The only difference between the contactors is in the blowout, which is modified slightly for the alternating current. The company finds that the greatest advantage comes in the use of heavy pressures, which it is enabled to get on the contactors by the use of compressed air. This, combined with an effective blowout, makes a very good operating switch. The company has installed a considerable number of equipments for the smaller-sized motors quadrupled forty horse-power and sixty horse-power, and is getting very good results.

The report of the Committee on Inspection and Maintenance of Electrical Equipment was presented by L. L. Smith. The committee recommends that the control equipment of the K type be given a thorough overhauling for every 60,000 miles of service. The multiple-unit control, M type, should also be given an overhauling on a 60,000-mile basis, as should the multiple unit electropneumatic type. With regard to inspection, it is well to understand that inspection made by night is less reliable and more expensive than that made by day. The committee recommends that this question be given careful consideration by those doing inspection work by night. It would seem that a satisfactory slack adjuster for brakes is very much needed in order to obtain length of service from this part of the equipment. With regard to car wiring, it is recommended that where wires are run through metal conduit, before reaching the main fuse or circuit-breaker a wire or ribbon fuse be placed on the roof of the car, near the trolley, of such capacity as would blow only in case of a short-circuit of the wire before reaching the main fuse or circuit-breaker. There is a tendency to increase the life of trolley apparatus and give it more frequent inspection. The committee recommends the importance of having trolley contact springs of sufficient capacity and in good order, so that they will carry the current from the wheel to the harp, and thus prevent burning between the bushing and the spindle. In the matter of safety devices for the protection of wire and apparatus, the committee recommends the use of a fuse, in addition to the circuit-breaker on all equipments requiring a current-carrying capacity of over 200 amperes. The committee feels that sufficient attention has not been paid by operating men to the question of motor temperatures. The committee recommends that air-compressors be given a thorough overhauling and test electrically and mechanically at intervals not exceeding 50,000 miles, and periodical inspection at 1,000-mile intervals.

C. B. Fairchild raised the question as to whether it would not be a good idea to operate on a ton-mileage inspection rather than on a time or mileage inspection. The heavier roads, for instance the Interborough, of New York, have adopted a ton-mileage basis of inspection.

William Roberts stated that with his company, cars were inspected every night in the barn. There is one section with fifty interurban cars and another section with sixty city cars in the city of Akron, Ohio. An inspection is made every day—that is, an inspection of the motors on the floor—and if there is any adjustment of brakes to be made it is done at this time. The company operates over a thirteen per cent grade, and one section is subject to an ordinance which requires two stops. When a car gets away from the motorman on a thirteen per cent grade it means a disaster; consequently, the company must be very careful in its brake inspection.

J. W. Harper, of the Capital Traction Company, Washington, D. C., said that his cars were overhauled very frequently. The company does not always take those that have made the largest mileage. A certain number of the cars go to the shop every week for a general overhauling, and the inspection at night in the car barn will average about every fourth night, giving the barn inspector time to go over the whole car. The general inspection includes overhauling and everything, and will average about once in six weeks.

TUESDAY MORNING SESSION.

The first business of the Tuesday morning session was the report of the Committee on Way Matters. The report was embodied in reports from various subcommittees and reports of investigations carried on during the year. The first paper under this head was presented by George L. Wilson, of the Twin City Rapid

Transit Company, Minneapolis, Minn., entitled "Care of Electric Railway Tracks."

This paper discussed the subjects of interurban tracks, analyzing the grade, ballast, construction of bridges, culverts and crossings, the removal of rubbish, weeds and unsightly objects of all kinds from the vicinity of the roadway, the proper consideration given to the securing of good employés, the care of city tracks, the matter of street cleaning and street sprinkling. The use of oil for laying dust on some streets and for roadbeds of railways has been extensively advocated. In practice the roadbed is sprinkled with about 2,000 gallons per mile for the first application. After the first dressing the quantity may be lessened to 600 or 1,000 gallons per mile annually. Few electric roads have used oil. From the reports of the roads using it, it appears that managers of steam roads, at least, do not consider its use profitable, and there is no general movement to adopt it. On electric roads on private right of way, or on macadam streets outside of the built-up sections, it may prove to be economical where the oil is obtained at low prices.

With reference to snow removal, the universal practice is to keep the tracks open for service by the use of plows and sweepers during and immediately after each snow-fall. The snow then deposited on the rest of the roadway is left, so far as it can be done without impeding travel. At crossings and congested points in business districts all companies assist in removing snow as promptly as possible by the use of carts and teams.

In many cities no separate account for expense of snow removal is kept. Figures given show results of $17.41 per mile of single track in a city of 175,000 with 140 miles of track in Indianapolis for an average winter. In Chicago, in 1906-1907, the cost was $41.13 per mile of single track for the Chicago City Railway Company; while in Milwaukee, eighty-five miles away, but a very small expense was incurred. Another lake city, Detroit, reports $35 per mile for an average winter. Duluth gives $45.45 for an average winter. Toronto reports on ninety-eight miles of single track in 1904-1905 a cost of $102.04 per mile for one-third of street area. In Montreal, where the company pays one-half the cost of removal, the average per mile of city streets is given as $2,618.46. Providence, R. I., reports a cost of $148 per mile of single track in 1906-1907. Here all snow over four inches in depth is removed.

E. O. Ackerman, engineer of maintenance of way, Columbus Railway and Light Company, Columbus, Ohio, opened the discussion. The maintenance bills for a long time after work is put down depends largely upon the original construction. He finds that the expense of keeping up suburban tracks runs into more money than the expense of keeping up city tracks. The labor bills are greater on suburban tracks than on the average city construction. The matter of cleaning the streets is also very important. The cleaning of vegetation from the immediate vicinity of the track, which is the universal practice of all steam lines, is not the universal practice of all electric lines. The vegetation has the effect of decaying the timber, and in that way is very detrimental. With regard to the securing of proper employés, it is his opinion that the street railway should look for the best labor. He believes that the most effective work is done at the lowest cost when the best labor available is secured. The wages should be such as to command the best men, and the maintenance of street railways requires that workmen with at least some mechanical ideas should be employed. The matter of maintaining city work is worthy of further discussion. Every railway man knows that a considerable portion of his maintenance goes for the repair of pavements. This is quite frequently caused by defective foundations as well as by the wearing of the surface. He had found it necessary to remove old foundations that were hurriedly built and replace them with a better quality of foundation, in order to reduce maintenance bills. He thought that where bolted joints were used, a great deal of trouble ensued. The joints require considerable labor to keep them in repair. He has practiced the universal plan of replacing old, worn and out-of-date joints with a modern style of joint wherever the street is disturbed. In this way it takes a long time to entirely reequip the line with modern joints, but it is the best policy to do so. He found that electrically welding the joints was of great advantage in holding old work together.

C. H. Clark emphasized the importance of machinery in maintenance instead of utilizing brawn and muscle. On a road that he had been connected with there were a couple of derrick cars and two big derricks in the yard, stone-crushers and everything that went to do away with labor. It was found, for instance, that a little derrick car could go out and replace a switch with about six men, the derrick car taking the whole switch out and throwing the new one in, where it was left to be simply bolted up. Broken stone delivered to the company on freight cars was unloaded with a hoist grab-bucket for about one cent a ton. Unloaded by hand, this could not have been done for less than seven or eight cents. A stone-crusher was used to take all the stone off the street for the company's own roadbed work.

F. G. Simmons agreed with Mr. Clark that machinery would not only tend to reduce cost in track construction and maintenance, but would also have a tendency to have the work more carefully done. With regard to beautifying the roadbed, Mr. Simmons said that his company had opened a special account described as "parking and beautifying of roadway." If there is any extra ground at any of the stations, grass and flowers are planted and flower-beds carefully arranged. His company is arranging now at one point on the system to put in some greenhouses, where it will raise its own plants and shrubs for that purpose. The company also paints all the poles on its right of way uniformly. The poles are painted white with a black base up to a certain uniform distance above the level of the rail. This feature of the care of the roadway, he thinks, is very important. This applies particularly to interurban roads. His company has track-walkers, and is preparing for them specifications and instructions which include not only the inspection of the track and the joints and various conditions pertaining to the mechanical features, but also the closing of the gates along the right of way as they pass by and see places where the farmer has inadvertently left gates open. There are many other things of this kind that are to be included in the track-walker's specifications, so that he does not become a burden. There are enough important items of work for him to do to more than warrant his wages.

The question of paving right of way on city streets is largely a tradition which has been handed down from the horse-car days. The present cars do not wear out the pavement, although some of the city authorities justify the placing of these repairs on the companies by saying that the tracks and joints go down and the pavement rises through frost and other causes. He thinks that this could be eliminated by the proper laying of the track and pavement. This might be regarded as heresy, but he would be glad to be given an opportunity to prove that in the West there are tracks which have been down for years, and which are just as perfect as any other grooved girder rail in the country. The whole question comes back to doing the work well, doing it uniformly, and understanding the specifications. He hoped that the association would go thoroughly into the matter of standard specifications, particularly where they were applicable to the way department. He thinks that this department has been run in a more haphazard fashion than any other department of the companies. A few years ago he found that a foreman on one class of work was doing his work one way, and the foreman on another section was doing his work in a very different manner. The result was that there were many different lines of work carried on in the same system. The drainage ditches at the side of the right of way were two feet from the fence line in one case, and four feet in another. If standard specifications are prepared and the foremen are instructed as to the

manner in which the ditches should be dug, then every man is working on the same idea and an absolutely uniform result is secured.

The question of help has become a very difficult one, particularly in large cities. The padrone system among foreign laborers is very detrimental to the securing of good work. If the higher scale of wages is paid, it will be found that the laborers prefer to work for a large corporation where they receive monthly a check for their services without difficulty, to working for the ordinary city contractor, many of whom do not always pay, or if they do, do not pay promptly. These people do not think very far, and if the corporation's wages are a little lower than the other people's they leave and work for the contractor. On interurban lines it is not such a hard proposition. In many cases help can be secured from the small towns and villages.

W. Boardman Reed discussed the matter of snow removal in New York city. For years the snow was removed from the streets both by the street railway company and the city, under an agreement whereby the company cleaned certain streets from building line to building line, and the amount it was, under statute, obliged to clean throughout the entire snow-cleaned districts. Tickets were issued for each cart-load of snow removed, and it was found that there was a great deal of stealing in this direction. Major Woodbury, then street-cleaning commissioner, proposed paying for snow removal by inch of fall. This, it appeared, would stop entirely the matter of steals so far as the city or the railway company was concerned, and if any one were stuck, it was up to the contractor. The first year the city tried this system it cost something like twenty-seven cents per inch of fall, which was about equal to sixty cents per cubic yard, a tremendously high price. It was estimated that in the city of New York the average shrinkage was between seventy and eighty per cent. The contracts for the last year have been let for twenty cents. The railroad company was able to let the contract for from twelve to fourteen cents per inch of fall, and, making a computation at the end of the season, it was found that it cost a little more than the old method of removal by cart-load, but in this case the streets were cleaned, whereas by the old method a good many yards of snow were left on the street. It made a big improvement not only in the running of the cars, but the streets were cleaned, so that full traffic conditions were restored and the earnings rapidly brought up to normal.

E. H. T. Ryder raised the question of the best method of ballasting the road and the best position in which to place the drains. Sometimes it is very difficult to get good ballast. From an operating point of view, if the ditches are dug deep enough to keep the water off the surface of the track, this frequently satisfies the operating man. For maintenance purposes it seems to be very necessary to dig the ditches deep enough so they are at least below the bottom of the ties. The question raised is, how far can the ditches of interurban work be replaced by laying tilted drains beneath the tracks, if it is a double track, or alongside if it is a single track. His company, in double-track work, is generally laying the tiles so that the top of the tile is about six inches below the bottom of the ties. A certain amount of good ballast material is brought in to lay around the tile in the ditch. In single-track work the company has generally laid its tiles alongside of the track, rather than under the track, with the idea that it would be easier to replace them and look after them. Of course, it does not give as good drainage, because the water has twice as far to go to the pipe.

E. O. Ackerman stated that his company has sometimes placed the tile two feet below the base of the rail in the space between the tracks, and then filled over the tile with broken stone so as to admit the water. He thinks there should be some provision made to take the water away from the track wherever the cities have seriously objected to putting the water into the sewer.

M. J. French believed that the open trench is the best form of drainage. He did not believe in tile drainage. He was also interested in the matter of maintenance and cost for repaving. With regard to the matter of material from jobs in the city streets, he finds that there can be a great amount of money saved if the old matter is put to good use, especially the old paving blocks and old concrete. During the past year on one piece of work where a single track was rebuilt with double track, nine-inch girder rail, he was surprised to find that he could rebuild almost the entire line without any new stone by breaking up the old concrete and the paving blocks. His experience with the concrete was that it cost from forty to forty-five cents per cubic yard to break it up. The paving blocks cost sixty cents per cubic yard. He found he could save much more money by redressing them for fifty-three cents per square yard, and although the block is very much lighter, it comes in for good service in repaving the streets where there is not much traffic.

The Committee on Rail Corrugation presented its report through Mr. Simmons. This report showed that seven out of thirteen companies supplying information stated that the corrugations occur on the outer rail or slight curves. One company states distinctly that the corrugations are found on the inner rails of curves of large radius. Three state that the corrugations occur on straight track. Braking seems to have little effect, although three companies distinctly state that corrugations occur where brakes are most frequently applied. The Philadelphia Rapid Transit Company, which appears to have had the greatest experience with this phenomenon, believes that the primary cause of corrugation in street-car rails is vibration either in the rails or in the entire track structure—that is, the wheels of the motor or other power-driven cars have a tendency to skid or slip because of the rapid vibration of the rails, which, by reason of the inertia of the car, the wheels are unable to follow instantaneously. The corrugations may arise from any one of four different causes, namely: the vibration or lateral bending of the web of the rail itself, the rails being loose on their supports, the ties being loose on their foundations, the vibration or movement of the foundation immediately under the track structure. Each condition produces corrugations of a different character, not only in length and form, but also with certain other peculiarities difficult to explain without referring to a case in point. It is very difficult to grind off the summits of corrugations without a specially constructed machine mounted on a truck, and it is practically impossible with the usual portable grinding equipment. To prevent the possibility of trouble from bending of the webs, the web of the heavy rail is increased to a thickness of nine-sixteenths of an inch. Where this has been done on a system of 600 miles, the amount of corrugated rail has been reduced to a very small percentage.

G. L. Wilson thought it peculiar that almost all the cases of corrugated rail occur in paved streets. On earth streets, or on track which is open track, it very seldom if ever occurs, and this condition of things seems to be not only uniform among the different cities of the United States, but the foreign writers on the same subject seem to find that the corrugation is confined almost entirely to streets with a very firm and solid stone ballast, or with a rigid foundation of some kind, so that it does not seem to be a question of the defective foundation altogether. He did not think that filing off the corrugation prevented the recurrence of the trouble.

C. Voynow believed that the principal reason for the corrugation was the rigid foundation. On tracks that are tamped on dirt, on T-rail tracks, where the rail can move in all directions, corrugations occur very seldom. The firmer the foundation and the heavier the traffic the quicker the corrugations will occur. This has brought about the idea that the corrugations are caused by the elongation of the upper surface of the metal under traffic. When the rail is free to give, that elongation may form a vertical curve, and that curve, as a matter of fact, goes back sometimes, but when the foundation is firm and unyielding, the surface metal, the metal which is elongated on the upper

surface, is probably pressed together in irregular humps, and these irregular humps are being taken off by the rear wheels of a single-truck car. The reason, he thinks, is that after a corrugation is thoroughly filed the surface generally is hardened under the rolling, and the corrugation does not occur again.

W. Boardman Reed said that in his experience in New York city he never noticed any corrugations. The track is laid on cast-iron yokes, five-foot centres. The yokes are solid and rigid, but there is an opportunity for the track to give between the yokes, and it does so give, as a girder would give supported at the ends. He thought that this goes quite a distance in bearing out the remarks of Mr. Voynow.

F. G. Simmons said the experience had in Milwaukee with corrugated rails had been very slight, and while it would seem to bear out the remarks of Mr. Voynow, there was one peculiar thing about it, which gave rise to other questions in his mind—the corrugations appeared on tracks supported on ties at the regular spacing with the method of concrete construction, which consists of six inches of concrete below the tie, between the tie and around rail, up to within about four inches of the surface. This track, after having been in a year, showed corrugations, very slight and minor, and the city had laid the abutting pavement against the track and the concrete on the top, which came up around the rail, and they had laid it in an inferior manner. In the course of the following year this pavement and concrete loosened up somewhat, and as it loosened up the corrugations disappeared. The peculiar circumstance in connection with it was that this condition appeared at three different places on the system, and at these three places the rails laid were all of one rolling of rail. There was one certain rolling of rail received from one company which showed the corrugation, and that is the only one. That brought to his mind the idea that possibly something in the composition of the rail, or the method of preparing it, was at fault, to some extent.

The next matter under consideration was the report of the Way Committee on "Concrete Tie Investigation." This committee had made some investigation in this direction and had accumulated quite some data, but at the present time simply a report of progress was made.

The report of the sub-committee on "Rail and Rail Matters" was presented by C. H. Clark.

After reading the report he said: "We say in our report, substantially, that the selection of the best type of rail is up to the city—if the city will let us we will put in the best type of rail, but we do not say definitely that it is the best construction. We therefore desire to amend our report so as to make it read as follows: 'Your sub-committee on rails and joints, as a result of its study, recommends as the best practice, and as standard for city construction in paved streets, the use of a seven-inch T-rail known as the Lorain section No. 95,400, and the Pennsylvania Steel Company's section No. 272.'"

The Committee on Nominations was then announced: C. H. Clark, Buffalo, chairman; George L. Wilson, Minneapolis; Charles Hewitt, Philadelphia; George J. Smith, Kansas City; W. D. Wright, Providence, R. I.

TUESDAY AFTERNOON SESSION.

The report of the committee on "Standardization" was presented by W. H. Evans, chairman. This committee investigated the following topics; namely: (*a*) Standard axles, journals, journal bearings, and journal boxes. (*b*) Standard brake shoes, brake-shoe heads and keys. (*c*) Standard section of tread and flange of wheel. (*d*) Standard rails. The data presented in this report is a guide toward uniformity of practice although it is suggested by the committee that it will be some time before some companies can adopt some of the specifications.

N. W. Storer called attention to the gear fit, and especially to the position of the gear faces with reference to the flange of the wheel or to the position of the motor on the axle. It was determined by the committee that this gear face should be in a standard position on the different axles in order that motors of different manufacture could be placed on any axle; that is, that the motors would be interchangeable as far as gears and axles are concerned. That, he thought, is one of the most important decisions arrived at in connection with the subject. One point he believed would be an advantage to change. That is the overhang of the gear for the small axles, that is the axle having forty-eight inches between the hubs. He would like very much to see that gear flush on the motor side of the gear, and have the one and one-eighth inches overhang on the wheel side.

Mr. Evans said, the point which Mr. Storer raised was quite a good one, since it corresponds with a large number of equipment which they already have in service; but the committee thought that since the representatives of both the Westinghouse and the General Electric had been at previous meetings, it was thought well to carry this over until after the convention, and in the meantime possibly harmonize any difference between the designing engineers of the General Electric and the Westinghouse companies.

Mr. Ayers stated that on the Boston & Worcester Street Railway the practice is to have practically only two diameters for the axle altogether, one diameter at the journal box, and the rest of the axle one other diameter. The smallest size of interurban equipment uses GE-57 motors, and an axle four and one-half inches in diameter everywhere except at the journal. There is no keyway, the gear is pressed on and the wheel is pressed on. The fact that the keyway is omitted seems to him to remove the reason for having the axle large at that point. In the larger equipment a five and one-quarter-inch axle, four and one-quarter-inch at the journal box and five and one-quarter-inch everywhere else, is used.

A. H. Weston said that the association in adopting the journal box standard as recommended by the committee would confer a very great benefit on the traction companies; greater than on the journal box manufacturers. One of the most discouraging things to the journal box manufacturer up to the present time has been the great varieties of patterns he had to carry to supply the traction company demands, with the result that the car builders in receiving orders for repair parts got more than their share of the profit, more than they should have received, and he did not believe it will be imposing any greater hardship on the truck builders and car builders, to design their trucks to suit a standard journal box than to suit a standard axle.

Mr. Evans said that with respect to the brake-shoe recommendation they had been favorably considered by the brake-shoe-makers and they were anxious to get the number of patterns reduced as much as possible, and while they do not commit themselves to say so, they intimated that it would be commercially a great advantage to have a standard pattern of brake-shoe. In this connection the brake-shoe recommended is adaptable to use on any steam-road equipment which any of the properties may be operating in connection with the one the electric men use—it is interchangeable with the regular steam-road pattern, but the narrow shoe is simply recommended to take care of the narrow wheels which are in service.

Mr. Ayres was inclined to think that there ought to be one more style of wheel shown with the two and one-half-inch tread and the seven-eighths-inch flange.

Mr. Evans replied in regard to the question of the seven-eighths-inch flange and two and one-half-inch tread that if the gentleman is using two and one-half-inch tread, with a seven-eighths-inch flange, there is no reason why he can not use three-inch tread with seven-eighths-inch flange.

The report of the committee on "Open

versus Closed Terminals for Car Houses," was presented by Martin Schreiber.

Mr. Schreiber also said that the thought had come to the committee that another design might be considered that has never been tried, and that is to take a car barn laid out with one-third of the cars covered and protection for officers and men's quarters, and then for the other two-thirds to be built with a sort of a cheap umbrella-type of protection.

The committee submitted several lay-outs representing actual practical examples of car-barn operation. Taking everything into consideration, the committee concluded as follows: 1—Mild and comfortable climates will be favorable to unprotected yards; extreme weather would make closed terminals desirable. 2—Inability of management to get large sums of money for investment would favor an open terminal. 3—Anticipated change in location would favor an open terminal. 4—A large proportion of cars when out of season stored in separate storage barns leans toward unprotected terminals. 5—The more cars housed, and the less on the road the entire twenty-four hours, favors protected trackage. 6—If the terminal is used for storing out-of-service cars as well as actually operating rolling equipment, it makes protected depots a necessity. 7—If terminal is located at lay-over points or end of trips for all cars, so that they may be inspected at turning points, and no repairs are made at night, this would be a point in favor of an open operating barn.

W. J. Harvey said that the experience in Utica had been that varnish deteriorates very rapidly in this climate in open storage. In the city of Syracuse they have just finished a storage yard which has nineteen tracks in it for open storage.

A report of progress was made by the committee on "Operating and Storage Car-House Designs."

The Question Box, which had been worked out in a very complete manner by the secretary, S. W. Mower, contained fifty-five questions. There were a large number of answers to some of the questions, and some answers to all of them.

Supplementing the Question Box the question was raised as to the practice on some of the roads as to the disposition of lightning arresters along the line; whether there is any generally adopted plan of placing them at certain intervals.

Vice-President Simmons states that his road endeavors to place lightning arresters at least every half-mile on all interurban lines.

P. Mitchell stated that he placed lightning arresters in deep railroad cuts and on high spots found most subject to lightning.

William Roberts said it was his practice to cluster lightning arresters on high spots and to cluster them very thickly around the power-house. On every pole around one power-house at Cuyahoga Falls that is particularly susceptible to lightning, he has placed twenty-four lightning arresters.

The fact that his trouble has been decreased he attributes entirely to the placing of the lightning arresters around the power-house, and also to this fact, that on one of their long-distance lines they have a station storage battery and on the other a line battery. They are the best lightning arresters in the world. He would advise any one up against this proposition to investigate and find out where the trouble starts and group the lightning arresters, and not be afraid to spend money on lightning arresters, and put them all around the power-house.

WEDNESDAY AFTERNOON SESSION.

The first item on the programme was the paper entitled "A Year's Experience with Gas Engines," by Paul Winsor, chief engineer, motive power and rolling stock, Boston Elevated Railway Company. Mr. Winsor could not attend and Charles Hewitt, of Philadelphia, read the paper.

Mr. Winsor gives figures for the Somerville power station, which is generating direct current feeding into the overhead system in multiple with the steam-driven power stations of the Boston Elevated Railway Company. The Somerville station has the following equipment: one pair of Loomis-Pettibone gas producers with the usual auxiliaries; two 600-brake-horse-power Crossley gas engines, each two-cylinder, four-cycle; two 350-kilowatt Crocker-Wheeler direct-current generators. The plant was started in May, 1906, and has since then given continuous, reliable and satisfactory service. There have been no shut-downs, no accidents and no failures. The fuel has been soft coal, the same as used in the steam stations, mostly run-of-mine Pocahontas. In the period from January, 1907, to August, 1907, the total kilowatt-hours generated were 988,980. The total coal consumed, including coke, was 2,012,388 pounds. The pounds of coal per kilowatt-hour averaged 2.034. The station load-factor, based on sixteen hours per day and seven days per week, was 41.6 per cent. The engine load-factor was 83.8 per cent, and the generator load-factor, 98.35 per cent. The figure for efficiency, 2.034 pounds of coal per kilowatt-hour, is significant as against the average for the steam plants of 3.477 pounds per kilowatt-hour. The gas-engine system showed a saving of 41.5 per cent. Mr. Winsor believes that a gas-engine plant making its own producer gas will operate at least as reliably as a steam plant, and will use from thirty to sixty per cent less fuel, depending somewhat upon the size of the gas plant, but principally upon the size of the steam plant. The drawbacks to the gas plant are, in his mind, the cost, approximating $200 per kilowatt, when rated so as to have thirty-three and one-third per cent overload capacity, and the small size of units, the largest gas engine now built being only of about 3,000 kilowatts' capacity.

G. W. Farmer inquired if the figure of 3.477 pounds of coal per kilowatt-hour was the average of all the Boston elevated steam plant consumption?

J. W. Corning replied that it would be the average of all but one plant, which was used only on peak loads; a very old plant, running non-condensing.

J. R. Bibbins had in mind two plants that are giving practically the same figures, one is the gas power plant of the Norton company at Worcester, Mass., 500-horse-power outfit, and on the regular ten-hour day-load it averages about two pounds per kilowatt-hour, including coal for all purposes, building fires, etc., and furthermore this economy is obtained with an engine loading-factor of about seventy-three per cent. It corresponds quite closely with Mr. Winsor's figures, 83.3. This is one of the recent plants put into service, using horizontal double-acting type of engine, and the results seem to compare very closely with those given by Mr. Winsor.

The next paper, entitled "Some Practical Points in Steam Turbine Construction, with Particular Reference to the Parsons Type," was read by St. John Chilton, engineer of the Allis-Chalmers Company, Milwaukee, Wis.

This paper described the Parsons type of steam turbine made by the Allis-Chalmers Company, Milwaukee, Wis. The improvement brought about by the construction of the blading in this type of turbine is worked out in detail, and also the matter of improving the balancing of the rotary system.

The paper, "Operating of Turbines in Railway Service," was read by August H. Kruesi.

Mr. Kreusi described the Curtis turbine

generators made by the General Electric Company, Schenectady, N. Y. The peculiar adaptability of the Curtis turbine to railway loads, which entail frequent variations in pressure and temperature, is, in a large measure, due to its having no revolving parts subject to high pressure or temperature. A figure is given, representing tests made by the Edison Electric Illuminating Company, of Boston, on a five-stage, 5,000-kilowatt turbine of recent design. A figure is also given of a test of a 9,000-kilowatt turbo-generator at Chicago.

These tests indicate that the hourly steam consumption, from no load to full load, and to a point considerably beyond rated load, follows a straight line when plotted to load, and that the total consumption of steam includes a fixed amount plus an additional quantity proportional to the load.

William Roberts thought that if we are to increase the boiler pressure we will have to have some different construction for our boilers. There is one thing that should be pointed out to any one contemplating the purchase of turbines, and that is that under varying loads at varying steam pressures you can depend upon the turbine to do work that a reciprocating engine can not do.

Dudley Farrand, of the Public Service Corporation of New Jersey, said that the water-step bearing has been changed to oil, with a little better results. They are using with all turbines a surface condenser for the reason that they have ample condensing water. The first turbine was installed in an ordinary steam plant, built for 175 pounds pressure and they were only able to give it 140 pounds of steam, but allowing for the difference it comes up to approximately its guarantee. Concerning the question of first cost, at the present time he did not see how any company could afford to put in anything but turbines in the large installations. The difference in first cost would provide a very much greater capacity, and talking on the investment side of the question alone there is no doubt about the value of the turbines.

Mr. Farmer said that the Old Colony Street Railway had some 10,000-kilowatt capacity in Curtis turbines installed at Quincy, and three 500-kilowatt machines installed in the Newport lighting station. They started at Quincy with all the auxiliaries electrically driven, but their experience was such that they soon changed one of them to a steam-driven type and when the fifth unit was being installed, they put that in with steam also. They expected great results from operation with electrically driven units, but after some practical experience with them, found it very advantageous to have steam.

J. R. Bibbins, of the Westinghouse Machine Company, presented his paper on "Recent Developments in Steam Turbine Power Station Work."

Mr. Bibbins's paper was devoted principally to the turbine manufactured by the Westinghouse Machine Company, East Pittsburg, Pa., and made an analysis of the Spy Run station of the Fort Wayne & Wabash Valley Traction Company. A valuable table was included, giving comparative data of various operating stations, both in the United States and abroad.

After reading his paper Mr. Bibbins presented some results which have become available recently on a large turbine installed in the power plant of the New York Edison Company, waterside station No. 2. The turbine unit is rated at 7,500 kilowatts, but as shown during an emergency load which occurred some months ago, it carried nearly double that capacity, sustaining a load of 13,500 kilowatts for some forty minutes. During the eight-hour test run the best result obtained for a continuous hour was 14.72 pounds per kilowatt-hour.

The report of the nominating committee was presented and unanimously accepted as follows:

President, F. G. Simmons, superintendent of construction and maintenance of way, Milwaukee Electric Railway and Light Company, Milwaukee, Wis.

First vice-president, Paul Winsor, chief engineer of motive power and rolling stock, Boston Elevated Railway Company, Boston, Mass.

Second vice-president, F. H. Lincoln, assistant general manager, Philadelphia Rapid Transit Company, Philadelphia, Pa.

Third vice-president, W. H. Evans, master mechanic, International Railway Company, Buffalo, N. Y.

Secretary and treasurer, J. W. Corning, electrical engineer, Boston Elevated Railway Company, Boston, Mass.

Executive committee—Officers and W. J. Harvie, electrical engineer, Utica & Mohawk Valley Railway Company, Utica, N. Y.; William Roberts, superintendent of motive power, Northern Ohio Traction and Light Company, Akron, Ohio; E. O. Ackerman, engineer, maintenance of way, Columbus Railway and Light Company, Columbus, Ohio; John J. Murphy, electrical engineer, Chicago Union Traction Company, Chicago, Ill.

Brief addresses were made by President-elect Simmons, and Mr. Evans, following which E. W. Olds presented the retiring president, Mr. Adams, with a beautiful clock on behalf of the association. Further remarks were made by Messrs. Roberts, Baker, Simmons, Fairchild and Corning, and the meeting stood adjourned.

The Appliance Exhibit—Manufacturers' Annual Meeting—Convention Notes.

THE appliance exhibit, under the direction of the American Street and Interurban Railway Manufacturers' Association, continued to give evidence of its attractiveness and instruction to the delegates and of its value to the manufacturers interested. In the issues of the ELECTRICAL REVIEW for October 12 and 19 the exhibits and representatives were covered very fully, and at this time it will suffice to give a few more notes of special interest.

One of the very interesting exhibits was that of Evans-Almirall & Company. This company installed its hot-water heating system in its exhibit, and called attention to its booth by means of a phonograph, which also produced many popular airs in addition to talking up the company's product.

The Franklin Electric Manufacturing Company installed a number of its "Novi" railway lamps in one of the big Brill cars, demonstrating all the claims that the company is making for this remarkable light unit.

The General Electric Company demonstration of the GE-90 railway motor coupled to a GE-202 commutating-pole railway motor, demonstrating the perfect commutating characteristics of these motors, attracted a great deal of attention. Another feature was the magnetite arc headlight. The mechanism is arranged so as to strike an arc of a fixed length. The upper electrode is a T-shaped copper forging, and the lower electrode an iron tube one-half inch by five inches, filled with material which will give the necessary vapor in the arc stream to produce an efficient luminous arc. The magnetite headlight is designed to operate at seventy-five volts and four amperes. The peculiar characteristic of this lamp is that for city work, with a reversal of current,

a copper arc of low efficiency is produced, giving a dimmed light which is very efficient in city service.

Amorg the General Electric representatives in attendance were: J. R. Lovejoy, vice-president; J. G. Barry, manager railway department; W. J. Clark, manager traction department; W. B. Potter, engineer railway and traction departments; E. D. Priest, F. E. Case, A. H. Armstrong, C. A. Jones, W. G. Carey, H. N. Ransom, R. B. Beale, F. H. Gale, S. W. Trawick, J. J. Mahoney, G. H. Calkins, E. D. Mullen, R. E. Moore, C. C. Peirce, C. E. Sprague, H. L. Monroe and G. D. Rosenthal.

The General Electric Company also had a very cosy and well-attended reception room in parlor 113, Marlborough-Blenheim.

The Westinghouse companies' exhibit made a hit every minute of the week. One could not walk along the pier in either direction without coming in contact with a Westinghouse representative or a piece of Westinghouse apparatus. The display of Westinghouse material was particularly effective, and at all times there was some intelligent person available to give complete information to those desiring enlightenment on any piece of apparatus in evidence. The company also held very popular receptions each day at the Chalfonte Hotel.

Among the Westinghouse representatives in attendance were the following: Westinghouse Air Brake Company—A. L. Humphrey, general manager; J. F. Miller, vice-president; S. C. McConaghy, assistant secretary; E. A. Craig, southwestern manager, Pittsburg; S. D. Hutchins, Columbus; W. V. Turner, Pittsburg; R. Burgess, Richmond; P. H. Donovan, Pittsburg; T. L. Burton, New York; E. L. Adreon, St. Louis; C. P. Cass, J. R. Ellicott, C. R. Ellicott, F. M. Nellis, W. G. Clark, F. V. Green, E. H. Dusen, George H. Martin, W. S. Bartholomew, E. J. Olmstead, H. S. Clark. Westinghouse Electric and Manufacturing Company—W. M. McFarland, acting vice-president; L. A. Osborne, vice-president; C. S. Cook, H. A. Coles, L. N. Reed, G. C. Ewing, T. Cooper, H. H. Van Staagen, J. C. Kyle, J. A. Brett, H. C. Stier, C. P. Billings, Q. W. Hershey, J. W. Busch, V. T. Smith, J. N. Dubarry. Westinghouse Machine Company—E. H. Sniffin, vice-president; L. C. Bullington, H. VanBlarcom, L. A. Phillips, H. P. Childs, S. M. Broman, E. L. Clark. Canadian Westinghouse Company, Limited—H. D. Baine, manager Montreal office. Westinghouse Companies' Publishing Department—J. C. McQuiston, manager.

The Samson Cordage Works, represented by Royal G. Whiting, had the misfortune to have its display of "Samson Spot" products held up in shipment, and was unable to carry out its original intention with regard to its exhibit until the last day or two of the meeting.

The Stromberg-Carlson Telephone Manufacturing Company exhibited a complete telephone dispatching system connected up for service.

The National Carbon Company introduced a new carbon brush, which was designated as the "Laclede," designed for heavy suburban work.

The New Departure Electric Manufacturing Company concluded its voting contest on the last day, and the prize, a silver loving cup, was awarded to Mrs. W. M. Qualey, of Brooklyn.

The annual meeting of the Manufacturers' Association was held on Thursday, October 17. President Beggs, of the American association, delivered an address expressing the appreciation of all for the efforts which the manufacturers had made to bring out the splendid exhibit. Mr. Beggs also complimented and thanked A. L. Whipple, chairman of the Entertainment Committee, for the satisfactory and efficient way in which the committee had taken care of its part of the programme.

President McGraw reported for the executive committee, and the report of the treasurer, J. R. Ellicott, showed that after paying all expenses, $1,500 would be added to the association's surplus, making a total surplus of about $5,500.

New members of the executive committee, to succeed the five members whose terms had expired, were selected as follows: W. H. Heulings, Jr., J. G. Brill Company; A. S. Partridge, William Wharton, Jr., & Company; E. M. Williams, Sherwin-Williams Company; H. F. Martin, Pennsylvania Steel Company; Otis Cutler, American Brake Shoe and Foundry Company. The executive committee is composed of the foregoing, together with the following, who hold over: James H. McGraw, McGraw Publishing Company; Frank C. Randall, Allis-Chalmers Company; Joseph R. Ellicott, Westinghouse Traction Brake Company; Henry C. Evans, Lorain Steel Company; K. D. Hequembourg, Franklin Car Lighting Company; Charles K. Knickerbocker, Griffin Wheel Company; Charles C. Peirce, General Electric Company; A. H. Sisson, St. Louis Car Company; Hugh M. Wilson, the Wilson Company.

Th executive committee was instructed to appoint a special committee to confer with the proper officers of the Railway Supply Manufacturers' Association (an association allied with the Master Mechanics' and Master Car Builders' associations), with a view to cooperative measures so as to develop such identity of interest as there may be between the steam railway and street railway associations in convention affairs. The committee appointed is composed of J. H. McGraw, C. C. Peirce and J. R. Ellicott.

The amateur vaudeville and dramatic entertainment, given on Thursday evening at Young's Pier Theatre, was largely attended and thoroughly enjoyed. The programme included the following features: Manufacturers' Quartette — John H. Thomas, first tenor, Philip Carey Manufacturing Company; F. H. Shipe, second tenor, Standard Paint Company; F. F. Vandewater, first bass, Standard Paint Company; John L. Wilson, second bass, Burnett Company. Clinton E. Weston, of the J. G. Brill Company, gave some humorous musical selections. A. H. Atkinson, of W. E. Baker & Company, gave interesting monologues. Jacob Wendell, Jr., W. M. Dennett, Charles G. Bush, Jr., and Harold W. Gould produced a very interesting sketch laid at the time of the Boer War. Joseph McKenna, of the General Electric Company, gave some impersonations of Lew Dockstader. John Lloyd Wilson gave reminiscences of the late Charles H. Hoyt, and E. Clinton Adams, of the Garlock Packing Company, entertained with a remarkable sleight-of-hand performance. The Manufacturers' Quartette rounded up the evening with a number of fine selections.

Transatlantic Wireless Telegraphy Established.

Wireless telegraphic communication across the Atlantic for news and business purposes was begun on Thursday, October 17, between Glace Bay, Nova Scotia, and Clifden, Ireland, under the Marconi system, a number of congratulatory messages and press dispatches being sent and received. The system apparently worked with reasonable frequency, with the expectation of improving the speed of transmission very materially. The first message sent in opening the service was from Sir Wilfred Laurier, Premier of Canada, congratulating the English people on the new achievement. Mr. Marconi, who was in direct charge of arrangements at Glace Bay, said that about 10,000 words had been received and sent on the first day. Congratulations were received by Mr. Marconi from Lord Kelvin, Sir William Crookes, Sir Oliver Lodge, William Ayrton and other prominent scientists and engineers.

REVIEWS OF CURRENT ENGINEERING AND SCIENTIFIC LITERATURE

On the Determination of the Mean Horizontal Intensity of Incandescent Lamps.

Some time ago Dr. E. P. Hyde and F. E. Cady described an investigation to determine to what extent revolving an incandescent lamp in order to determine its mean horizontal candle-power introduced errors. The conclusion was that, if any error were caused, it was slight. Another investigation of this matter was made later by Uppenborn, and gave results varying considerably from those previously published. Uppenborn found errors of nearly ten per cent due to the rotation of the lamp. To check the conclusions of their previous study, Hyde and Cady have again investigated the matter and put forth their conclusions here. In order to have this study comparable with that made by Uppenborn, special lamps were secured similar to the ones he employed. These were rotated and the horizontal candle-power measured at various speeds, the values thus obtained being compared with the average value obtained by measurement made at different angles while stationary. It was found that there was but little change in the candle-power at any speed until the filament came in contact with the glass bulb. As soon as this happened, there was a slight decrease in value and a corresponding change in the current taken by the lamp. The latter fact is thought to show that the change in candle-power is due to the cooling effect of the glass of the bulb on that part of the filament touching it, and not due to a distortion of the filament. Experiments were carried out with lamps of various forms having single and double filaments of various shapes, anchored and unanchored. The greatest decrease in candle-power found was about seven per cent. This was when the filament was touching the glass at two points. The highest value found with the filament not in contact with the glass was about one and one-half per cent, and it is concluded that the distortion of the filament, due to rotation, in all the present forms of lamps, will not produce an error greater than this value if the speed be not sufficient to throw the filament against the glass. There is another error which should not be overlooked in this investigation; that is the effect of the flicker, produced by rotation, on the ability of the eye to estimate correctly the true mean values of illumination. In the common types of lamps the error due to flicker, at a speed of 300 to 400 revolutions a minute, is probably not very great, and since the lamps may be rotated at these speeds without appreciably affecting the mean horizontal candle-power, it is concluded that the method of rotating the lamp is convenient and reliable for commercial testing.—*Abstracted from Bulletin of the Bureau of Standards (Washington), August.*

Accident to the Sydney, Australia, Tramway Feeders.

On August 7 the service on the North Shore Street Railway at Sydney, New South Wales, was abruptly interrupted, and investigation showed that faults had developed on both the high-tension feeders supplying this section from the North Sydney substation. These feeders were carried across the harbor, and at the time the interruption occurred it became known that a large steamer had been observed in trouble at the entrance to the harbor. She was coming in under easy steam, but was met by a strong gale which drove her down stream and across the harbor. She dropped anchor, which dragged, and it is surmised she dragged across the high-tension cables. The anchor held presumably on the cables, and on getting under steam and hauling in her anchor, the vessel again went forward and apparently carried the cables with her some distance past their original bed. The tests of the cables show that both had broken down. To repair them a punt was secured, towed by a small tug, which started to haul in the cables from the shore end. One of these was found to have broken down about a hundred yards from the shore, where the cable had had a severe twist. A few yards beyond this point the broken end of the cable was hauled in. The other end of the cable was found to have broken about four hundred yards from the shore. Dragging was then commenced for the lost ends. These were eventually grappled, but upon attempting to raise them the resistance seemed too great. When a diver was sent down it was found that a large anchor had become entangled in them. After hauling up the anchor there was no difficulty in recovering the cables. These were found to have been badly damaged and contained a number of sharp kinks. Besides, the armor was badly scarred and the cable flattened, showing that it had been pressed forcibly against some hard surface. By means of the parts of the cable thus recovered, and a few extra lengths on hand, it was possible to patch up one cable, lay it across the harbor and reestablish the street-railway service. This, however, was a matter of some days, as there were ten joints to make in the cable, each taking twenty hours. The work was all done on the punt; and by means of a lead carried over to the boat, the cable was subjected to high-tension tests during the repair work. The voltage of the supply transmitted to the cable was 6,600. It is noteworthy that after being in water five years these cables easily withstood an 11,000-volt testing pressure. The insulation of the cables is paper. A good deal of this was badly damaged when they were broken.—*Abstracted from the Electrical Review (London), October 4.*

The Heyland Cascade Single-Phase Railway System.

A résumé is given here by H. M. Hobart of an important paper read recently before one of the German technical societies by A. Heyland. The first part of the paper discusses the weak points of the single-phase commutator motors; the second half describes a new system proposed by Mr. Heyland. The latter thinks that the commutator is a severe handicap because, in order to secure sparkless running, this device must be made large, as compared with the commutators for direct-current motors. Moreover, to meet the severe starting conditions it is often necessary to increase still further the size of the commutator, and even then sparkless starting seems to be almost impossible. Another reason for the large commutator is the low-voltage necessarily employed with such machines. Altogether, the alternating-current motor, with its commutator, becomes a heavy and bulky device, being approximately fifty per cent

larger and more expensive than a continuous motor with equal output. In this respect the compensated repulsion motor is a greater offender than the series motor. Another drawback of this system is the large transformer required. This part of the equipment must be equal in output to the motors. Here the series motor is at a disadvantage compared with the repulsion type. The controller for the system also becomes larger and more expensive than a direct-current controller, and the power-factor is low or else the expense of compensating for it must be incurred. The ideal solution of the railway problem would be obtained by a system admitting the leading high-tension single-phase current direct to the motors without the interposition of a transformer. The system should also employ standard motors, and these should preferably be without commutators. Compensation for the phase displacement of the current should be provided both during running and at the start. Mr. Heyland thinks that these aims can not be attained with any single-phase commutator motor, and, for the severe conditions such as are met in heavy main-line railway work, the commutator must be dispensed with. The system which he proposes as the solution consists in coupling two single-phase induction motors in cascade, connecting the primary of the first to the high-tension supply system and the leads from the secondary to the primary of the second machine. To the three-phase connections between the rotor of the primaries and the stator of the secondary motor are connected leads from the rotor of a second single-phase excited motor. This motor runs idle—that is to say, it does not drive the car, but supplies exciting current to the two driving motors. By properly controlling the excitation of this exciting motor, phase control of the driving motors is secured, and the power-factor of the system may be maintained at unity. Moreover, this idle machine supplies a rotating field to the two motors which gives them the necessary starting torque. At the moment of start the idle motor is running at its highest speed. As the exciting currents enable the driving motors to start, they slow down the rotor of the idle motor, and in this way power stored up in the rotor of this exciting motor, due to its inertia, is utilized in the start. On stopping, the reverse process takes place, and the idle motor is speeded up nearer synchronism. The motor, therefore, acts not only as a phase regulator, but as an energy storer. The size of this machine need be only about one-half that of one of the driving motors. The machine itself may be either an induction motor or a synchronous motor, or even a rotary converter or motor-generator. In the latter two cases the secondary driving motor might be a direct-current machine. It is estimated that the total cost of such a motor equipment would be as low as that for single-phase commutator motors, since the transformer is eliminated and the machines are all of standard types. The starting current is a pure energy current, and the current taken during the start is but a fraction of that required by the single-phase commutator motors.—*Abstracted from Electrical Engineering (London), October 3.*

The Copper Situation in the United States.

A statistical review of the present position and the economic outlook of the copper industry is given here by James Douglas. Copper has of late occupied in the public eye a larger field of view than its importance warrants. This has been due to the abnormal price to which it has rapidly risen. This price has been in a certain sense fictitious, as probably none of the producing companies ever realized it on much of its product. During the past ten years there have been on an average eighty-four tons of iron consumed in this country, to one ton of copper, and the world's demand for the two metals was in the same ratio. However, the world's production of copper shows a notable falling off in the rate of increase. The production in 1897 was a little over 405,000 tons, and in 1906 718,000 tons, an average increase of 4.3 per cent per annum, while the increase last year was but a little over two per cent. A steadily progressive high percentage increase in price can not be maintained and should not be expected. Before the introduction of electrolytic refining only the richer copper ores were utilized, but now that this method makes it profitable to recover small quantities of gold and silver from the copper ore, it is profitable to extract ores of much lower percentage value. Previous to the introduction of this method, the shipper was charged $60 a ton for refining. Now it is done for $16, and since the average value of the precious metals is about $6, the actual cost is reduced to about $10 a ton. At the present time we are using up our resources of iron, copper and lumber at such a rate that they can not last. Nevertheless, there need be no immediate alarm of a heavy decline of the copper supply, as there are large sections in Minnesota, Wisconsin and Montana practically unexplored. Moreover, it is very probable that foreign ores will be shipped here in order to take advantage of our refineries. Even at the present time a good deal of ore comes in this way from Mexico, Canada, and even from New Zealand. To forecast the future of copper is impossible, though it is safe to predict that if no substitute is found and the demand for the metal increases as it has done, the supply of metal will fall short of the demand and the price must rise. It is interesting to examine the copper-ore resources of the world. Venezuela has practically ceased to produce copper; in Great Britain there has been a slow decline, and in Spain and Portugal the reduction is much more important, due apparently to the approaching exhaustion of the ore. In Germany the supply comes from one mine, which has been worked since the thirteenth century, and still has a comparatively long life ahead. Chili has exhausted her rich resources and is now beginning to develop the leaner ones; Bolivia and Peru will probably show increases, as will also Mexico and British Columbia. There are also wonderful possibilities in Alaska and Labrador. In Africa there is said to be a large copper region, but to reach it it is necessary to build a railroad one thousand miles long. Australia will probably continue to put out more copper; Japan is a growing copper country, but has had labor difficulties. The possibilities in Russia, in Asia and China are not known. The three principal uses of copper are in the manufacture of electric machinery and the transmission of power, the composition of alloys, and in architecture. The electrical industries consume about one-third of the world's supply, but little of this is actually lost. It is estimated that five grains of copper are lost for every car-mile on the electric railways, which represents about 5,000 tons of copper used up by the railroads each year. The use of alloys containing copper causes a heavy demand for this metal, which is increasing with the growing industrial activities of the country. The amount used for architectural purposes is hard to estimate. This is a comparatively recent use, as previously iron was the metal most employed. Copper for this purpose must be considered a luxury, but it is one which the people insist upon having.—*Abstracted from the Engineering Magazine (New York), October.*

INDUSTRIAL SECTION

ILLUSTRATED DESCRIPTIONS OF NEW AND STANDARD ELECTRICAL AND MECHANICAL APPARATUS

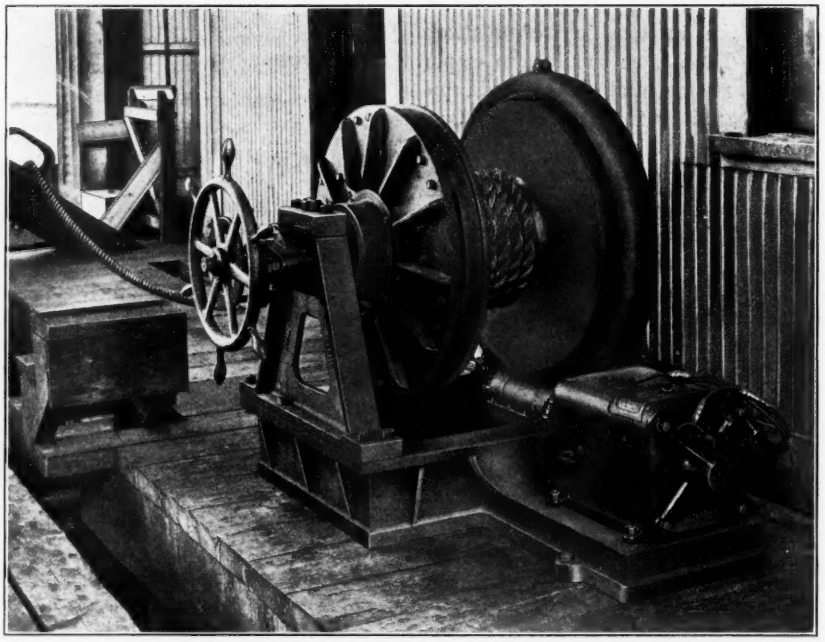
Slip-Drum Electric Winches.

The accompanying illustration shows the slip-drum hauling-in winch for handling heavy car floats at ferry slips, built by the Lidgerwood Manufacturing Company, 96 Liberty street, New York city. This is one of the most important applications of the electric drive to hoisting work which has been available for some time. The hauling-in of heavy floats of car ferries has heretofore been done exclusively by hand, geared winches in some cases being used. The great weight and size of the car floats make this a work of labor, requiring a man at each of two winches, and often calling for the services of a third man to direct the work. Even with double-geared winches, the power required is so great that it is often beyond the capacity of two men.

One of the unfortunate conditions which has prevailed with the hand-operated geared winches is the holding taut of the hauling-in rope after the float has been brought up snug to the apron of the dock. If anything should bump against the outboard of the float, or if a car, when being removed from the float to the wharf, should meet with some accident, there is a possibility of the holding rope snapping because of the rebound. With the geared hand-operated winch the drum is locked fast with a ratchet and pawl.

The new Lidgerwood slip-drum hauling-in winch eliminates the hand work and obviates the possibility of the accident just referred to. The operator stands in a tower alongside the apron, where he has an unobstructed view of the incoming float in one direction, and of the approaching cars in the other. The controller handles are so located that he has complete command of both the hauling-in winches and also of the apron-lifting device. As a float approaches, by a turn of the controller handle he adjusts the height of the apron, so that the deck, rails and toggles come flush with one another. As soon as the deckhands have made fast the hauling-in hawsers, he sets the electric winches to work bringing in the float.

Each of the two winches has its own motor and controller. Strain can be brought on one or both the hauling-in hawsers, according to the best way of bringing in the float or swinging it into position. The strain on the hawsers is always up to a fixed limit, but never beyond this. The slipping drum frictions are set so that the winches can put a full stretching strain on the hawsers; but the moment this is reached, the drums slip. The moment the drums slip, the strain is slightly reduced, and this reduction continues just as long as the slipping continues.



LIDGERWOOD SLIP-DRUM HAULING-IN WINCH.

The Lidgerwood electric slipping-drum hauling-in winches were designed to meet the ideas of the Pennsylvania Railroad when that company was preparing to put into use the yards and ferries established at Greenville, N. J., and South Brooklyn, N. Y., for transferring freight from the main terminal at Jersey City to Long Island. The slips at Greenville were equipped with these machines, and they have been in successful use there since the ferry was opened in October, 1904. During this time they have been subjected to the most severe tests. The slip-drum friction is of the type developed by Spencer Miller for maintaining a constant tension on the cables used in the Lidgerwood cableways for coaling warships at sea. It is designed to slip continuously under full pressure for an hour at a time, if desired, without destructive wear, and at the same time to maintain an even strain of any desired amount upon the hawser. The friction can be set, at the will of the operator, to give any amount of strain required. Those used at the Pennsylvania Railroad car ferry are set so that each exerts a strain on its hawser of 11,000 pounds before it begins to slip. This strain is reduced to 9,000 pounds as soon as the drum slips, and this pull is exerted continuously as long as the drum is slipping.

The "Trumbull Cheer."

The accompanying illustration of the November cover of "Trumbull Cheer" shows the general two-color design adopted by this little magazine, published each month by the Trumbull Electric Manufacturing Company, of Plainville, Ct.

The primary object of this publication is, of course, to put forward the new lines of Trumbull material which are continually offered the trade and to further popularize other material already well known.

This is done by the publishing of regular price lists with illustrations and discounts, and also by articles of more or

less technical nature showing forth various matters arising in the manufacturing field that are of direct interest to the contractor, jobber and purchasing public in general.

In the November issue there appears an article on the recent rulings of the Underwriters, covering switches for alternating-current work, also a detailed list of Trum-

bull's "A" line of switches showing the prices for 27,840 different type "A" switches as given in its bulletin. Panel boards and switchboards are also advertised.

The whole tone of the little magazine, as the title indicates, is cheerful, numerous epigrammatical sayings being introduced with catchy verses and reflections on business and general conditions. It is printed throughout in two colors on heavy coated paper and illustrated with caricatures and half-tone cuts which produce a decidedly pleasing effect.

The Big Four Railroad has again attacked the constitutionality of the ruling of the state railroad commission of Indiana in connection with the order of the commission to interchange freight cars with an electric railway company. The steam railroad now alleges impracticability due to the inability of the steam road's equipment to operate over the electric railway company's tracks.

Sixth Annual Report of the Allis-Chalmers Company.

The sixth annual report of the Allis-Chalmers Company for the fiscal period ended June 30, 1907, has been issued from Milwaukee, Wis., under date of October 1.

The report of W. H. Whiteside, president of the Allis-Chalmers Company, to the stockholders shows that during the year much attention has been devoted to systematizing the work of the engineering department, improving and simplifying standard designs, thereby reducing the cost of production and installation without impairing the efficiency or sacrificing quality. Development work in several new lines of machinery, namely, gas engines, hydraulic turbines, steam turbines, turbo-generators, induction motors, transformers, etc., has been carried to practical completion, and has been extraordinarily large, because of the wide range in the standard sizes and types adopted.

In 1903 the company designed and built its first turbo-generator, and since that time its detail has required no material change. Sizes ranging from 500 to 7,500 kilowatts have been completed and tested, and the success of these units under actual operating conditions has been established. Since its advent into the electrical field, the company's sales of steam turbines have reached nearly 100,000 kilowatts normal capacity. Compared with the previous year, the orders booked show an increase of $800,000.

Orders to August 1, 1907, for horizontal twin-tandem and double-acting types of gas engines, ranging in capacity from 500 to 5,000 horse-power, aggregate 189,350 horse-power. One notable contract covering the electrification of a steel plant requiring gas-engine electrical units has an aggregate capacity approximating 60,000 horse-power. Another installation for electric traction purposes comprises three horizontal tandem gas engines of 1,500 horse-power, each direct-connected to 1,000-kilowatt, three-phase, twenty-five-cycle alternators of the company's manufacture, and including substation apparatus.

The company has placed in operation during the year ten complete hydroelectric plants having a combined output of 105,000 horse-power.

The air-brake department was organized about the first of July, 1906, to exploit the sale of air-brake equipments, pursuant to an arrangement made with N. A. Christensen, the inventor. The company announces that a reasonable degree of success has rewarded its efforts to establish itself in this line of business.

During the past year the company has completed the development and manufacture of a considerable number of large alternating-current and direct-current generators, rotary converters, and direct-current motors of all sizes and capacities, transformers for both power and lighting service, street railway motor equipments, and electric hoists, all of which are in successful operation.

The results for the year have not been as satisfactory as expected, due to a combination of circumstances, including the general strike of molders throughout the country, the failure of contractors to complete buildings on time, the delayed delivery of equipment for new shops, and the large expense contingent upon the organization of the new plant and necessary development of new lines of manufacture.

Beginning with the last quarter of the year, most of the adverse conditions had been overcome, and the company entered an era of steadily increasing net earnings, which has been continued during July and August of this year.

The consolidated balance sheet shows the following assets: capital assets, $37,028,120.60; bonds and shares, $254,200; developments and patents, $1,115,742.42; discount and commission on bonds, $2,614,000; current assets, $15,337,200.19; profit and loss balance, $229,816.95.

The consolidated profit and loss account for the year ended June 30, 1907, shows a balance on June 30, 1906, of $157,481.19. The profit on operations of the last fiscal year, after deducting expenses of manufacturing and selling, interest, dividends on preferred stock of the Bullock Electric Manufacturing Company, and provision for doubtful accounts, is $1,226,242. Charges for maintenance, repairs and renewals on buildings, machinery, plant, tools, etc., amount to $854,503.32. The depreciation on buildings, machinery, plant, tools, etc., is charged up at $253,987.42, and interest on bonds, loans and notes payable called for $505,049.40, making a total of $1,613,540.14, leaving an operating deficit for the year of $387,298.14, which, deducting the balance above referred to, leayes a deficit, as per balance sheet on June 30, of $229,816.95.

Supplementing the sixth annual report, President Whiteside, under date of October 21, addressed a communication to the stockholders showing the results for the last quarter of the fiscal year ended June 30, 1907, and the results for the first quarter, ended September 30, 1907, of the present fiscal year. These figures show steady and substantial improvement since April, 1907, at which time the company first began to receive benefits from the newly developed lines of machinery built in its enlarged West Allis plant. The net earnings in excess of all fixed charges for that period have been $489,267.86. For the quarter ended June 30 the net profit shows a continuous increase for April, May and June, respectively, of $37,392.22, $69,418.12, and $93,540.63, making a quarterly total of $200,357.97.

For the quarter ended September 30, 1907, the gains were as follows: July, $81,001.77; August, $111,700.23; September, $106,207.89, making a quarterly total gain of $288,909.89.

The Marion Electric Association.

The Marion Electric Association, which has been organized by the Marion Electric Supply Company, the Columbus, Delaware & Marion Railway Company, the Marion Railway, Light and Power Company, and the Ohio Novelty, Sign and Electric Company, of Marion, Ohio, for the purpose of promoting the growth of electrical industries in Marion, will hold an electric exhibit, comprising about 2,500 feet of floor space, from November 23. All kinds of small electric appliances for both domestic and commercial use will be shown by the companies comprising the association. Companies desiring to display electric devices may do so through any of the above companies. While an exhibition of this kind is out of the ordinary for a town of the size of Marion, it is believed that it will be a good business-getter.

The Jamestown Exhibit of the General Electric Company.

The accompanying illustrations give an excellent idea of the exhibit of the General Electric Company at the Jamestown Tercentennial Exposition, Norfolk, Va. It will be noted that a portion of the company's space has been apportioned off as a model electric dining room and kitchen. The remainder is guarded with a brass rail, behind which is arranged a large variety of motor-driven tools and machinery. Adjoining the exhibit proper is the substation, where the current generated by the Norfolk & Portsmouth Traction Company is transformed and distributed for the lighting of the grounds and the supplying of motive power. The electric kitchen is finished in mission style and equipped with General Electric domestic heating and cooking apparatus. In the rear is the electric stove, holding an electric oven, grid, broiler, toaster and water heater. The motor-driven washing machine is exhibited in the kitchen, and there is an ironing board with an electric flat-iron, and other utensils. The demonstrating windows are filled with a variety of fans, kitchen appliances, etc.

The other end of the room is arranged as a reception room, finished in mission style with rugs, pictures, and a handsome mantel, which affords a proper setting for a luminous radiator. This portion of the display is in charge of competent lady demonstrators, and guests are invited to inspect the electric cooking apparatus and partake of the appetizing food which is prepared.

The space devoted to the display of industrial applications contains an automatic refrigerating plant manufactured by the Automatic Refrigerating Company, Hartford, Ct. A portion of the hand-rail is used as a return for the refrigerating

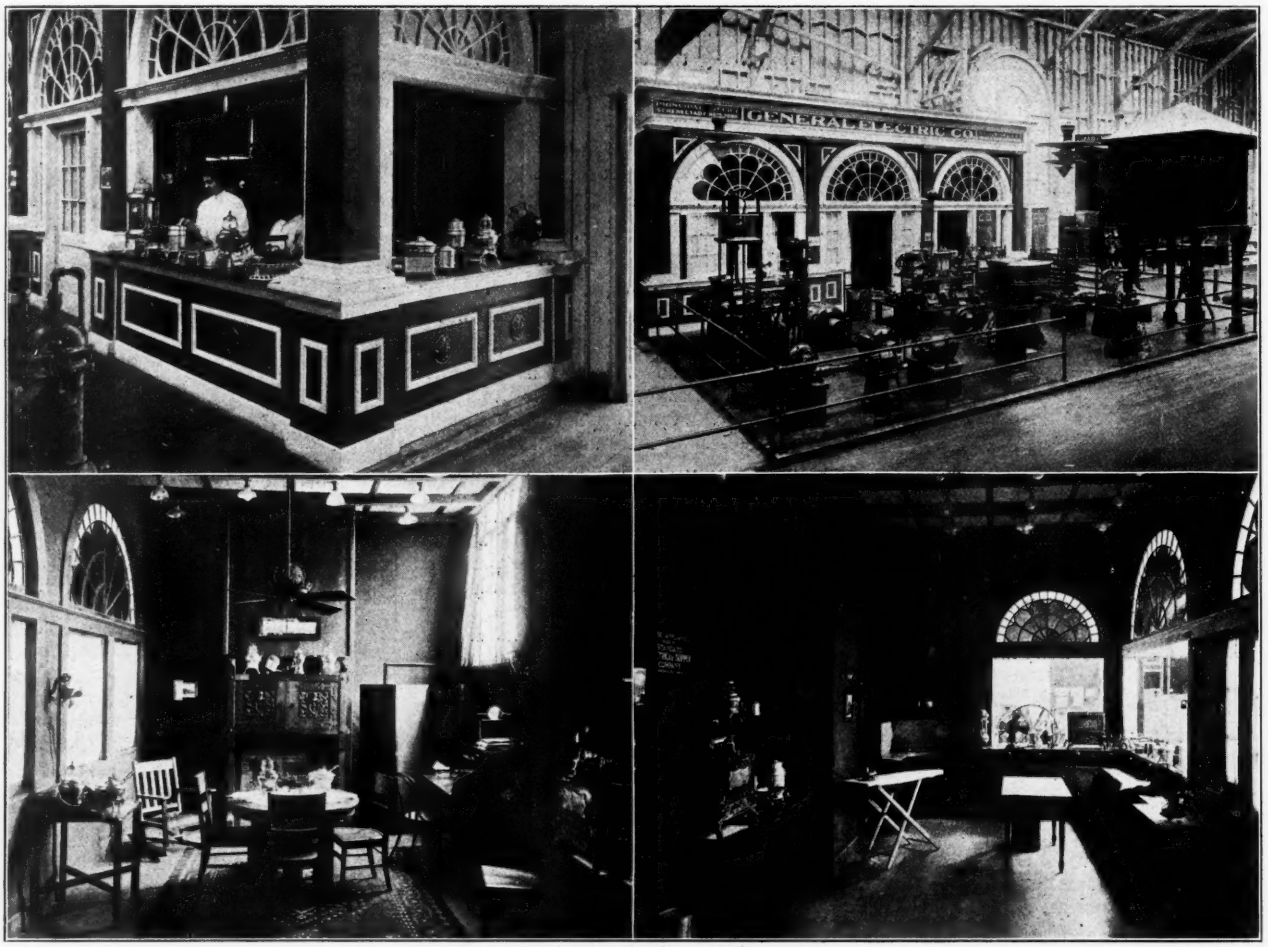
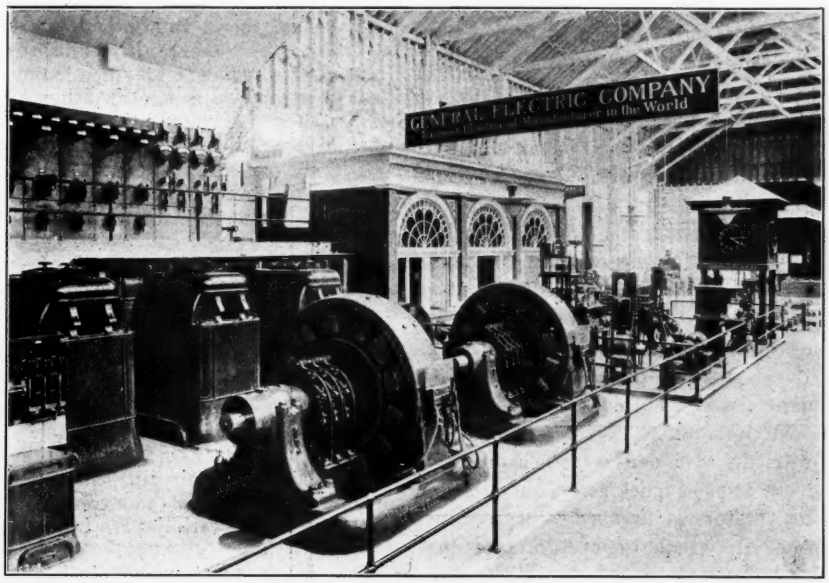


EXHIBIT OF THE GENERAL ELECTRIC COMPANY AT THE JAMESTOWN TERCENTENNIAL EXPOSITION, NORFOLK, VA.—VIEWS SHOWING THE DEMONSTRATION WINDOW, THE POWER EXHIBIT, THE RECEPTION ROOM, AND KITCHEN.

circulation, so that the visitors can feel just how cold it it. There is an electrically-wound Seth Thomas tower clock, and, near by, an Ingersoll-Temple electric-air rock drill. Among the other machines are a motor-driven sewing machine, blower, coffee grinder, meat chopper, dough mixer, washing machine, buffing and grinding machine, and an automatic house pump, all operated by G. E. motors.



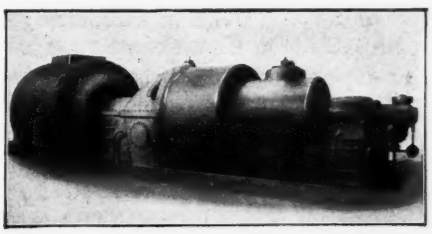
THE SUBSTATION AT THE JAMESTOWN TERCENTENNIAL EXPOSITION, NORFOLK, VA.

The substation is equipped with three 1,400-kilowatt air-blast transformers; two 500-kilowatt rotary converters; three 100-light arc-lamp transformers, and a switchboard, all of General Electric make. The station is also equipped with the latest type of remote-control electrically operated oil switches. The Norfolk & Portsmouth Traction Company's power-house supplies current from three 3,000-kilowatt Curtis steam turbine units. Power is generated at a pressure of 11,000 volts, and is transmitted at this potential to the substation, where it is stepped down for distribution.

About 45,000 eight-candle-power G. E. lamps are used in the decorative lighting of the exposition buildings and grounds, and besides these there are a number of twenty-four and thirty-inch searchlights.

Allis-Chalmers Steam Turbines and Generators in the Textile Industry.

Among the noteworthy features of the textile industry this fall, has been the ordering of steam turbines, of the improved type built by the Allis-Chalmers Company, for installation in some of the largest mills of New England and the central and southern states. Power machinery of the company's build has long been prominent throughout the country in manufacturing plants of every description; and, in the electrification of textile mills, Allis-Chalmers steam turbines and generators, as well as its induction motors for alternating current, are now playing a leading part. Contracts recently awarded by textile manufacturers include three turbines



ALLIS-CHALMERS STEAM TURBINE AND GENERATORS.

for the new 10,000-horse-power plant of the Pacific Mills, Lawrence, Mass.; one of 2,200 horse-power for the American Thread Company's Watuppa Mills; one of 3,000 horse-power for the Tremont & Suffolk Mills, and machines of 800 horse-power each for the Jamestown Worsted Mills and Cherry Cotton Mills.

These turbines are of the same general type as the machines installed on the record-breaking liners Lusitania and Mauritania.

"Victor" Combination Meters.

The accompanying illustrations show a new style of portable "Victor" combination meter placed on the market by the H. W. Johns-Manville Company, 100 William street, New York city. This meter is based on the D'Arsonval principle, and consists of two separate and complete instruments in one case, so situated with respect to each other and the scale that the energy consumption or output is directly readable in watts or kilowatts and horse-power at the intersection of the volt and ampere indicator needles.

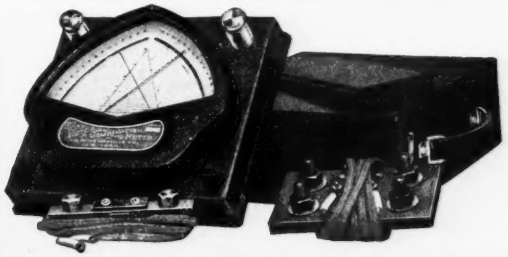


FIG. 1.—TYPE B-1 VICTOR PORTABLE METER AND SHUNT.

The ammeter movement is constructed on the milli-voltmeter principle—that is, the shunt carrying practically all the current is placed in series with the line, and the potential difference measured between its terminals.

In the portable instruments the voltmeter movements may at any time be supplied with external multipliers in order to increase their ranges. The ammeter movements are equipped with self-contained shunts up to and including 200 amperes, unless two or more ranges are desired, in which case the instrument is made on the milli-voltmeter principle, as explained, with external interchangeable shunts, either separate or contained in one compact box.

The type B-1 portable meter shown in Fig. 1 is mounted upon a polished ma-

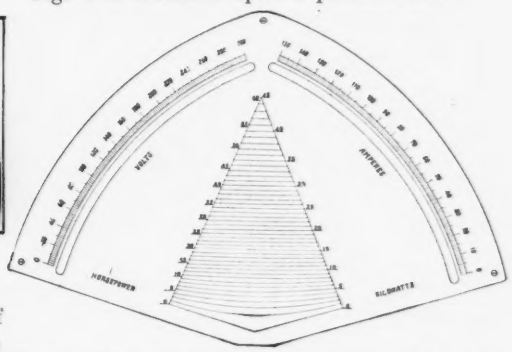


FIG. 2.—DIAL OF TYPE B-1 VICTOR PORTABLE METER.

hogany base and covered with a dust-proof oxidized-copper-finished top. It has a five-inch scale divided into 100 to 150 small divisions, as ordered (see Fig. 2), with knife-edge indicator needles and mirrored scale. It is especially designed for all laboratory testing where the highest degree of accuracy is desired.

The ammeter shunt is equipped with an internal shunt up to and including 200 amperes' capacity.

The voltmeter has self-contained resistance for capacities up to and including 750 volts. Above this point external multipliers are supplied. One, two or three ranges with self-contained multipliers may be furnished with the voltmeter, and for additional ranges external multipliers may be had.

A Demonstration of the May-Oatway Automatic Fire-Alarm System.

The first demonstration of the May-Oatway automatic fire-alarm system to be made in this country was carried out at the Royal Insurance Building, New York city, by G. H. Oatway, of the May-Oatway Fire Appliances, Limited, of London, before a representative of the ELECTRICAL REVIEW. Several tests of the system which had been installed temporarily, were made, and in every case after lighting the fire, the apparatus responded quickly, ringing a gong and dropping a shutter in the indicating cabinet. The time required to make this signal varied according to the distance of the source of heat from the detector. With a flame of alcohol placed on the floor about seven feet from the wall, with two detectors placed on the wall, close to the ceiling, the alarm was given in about sixteen seconds. With the fire removed to about fourteen feet, the signal was given in about one minute. In each case the fire consisted of a pan of burning alcohol, about two feet square.

This alarm system has met with a great deal of success abroad. Having been first put into service in New Zealand, its good work there led to its introduction in England and elsewhere, and it to-day has to its credit some of the largest installations of automatic fire-alarm systems in the world. One of these is particularly noteworthy, being that at the Anchor Mills of Clark & Company, Limited, at Paisley, Scotland, where the system installed requires about 119 miles of internal alarm circuits, ninety automatic telegraphs, twenty-one automatic position indicators, five and one-quarter miles of underground cable, telephones, alarm gongs, and an automatic telegraphic set communicating with the local fire company.

The essential part of this system is the detector, as this is really the nerve of the whole equipment. This consists of a copper wire about three feet long held within a thin steel channel bar so that it is slightly slack. From the centre of this is suspended a light weight carrying on its bottom a graphite cone. This weight is enclosed in a protected glass tube and is held suspended about three-eighths of an inch above two iridium-steel springs tipped with platinum. With this arrangement any sudden heating of the wire lengthens it slightly with, in consequence, a considerably increased vertical movement of the weight suspended from it. The multiplication of the motion here can be made as great as desired by increasing the length of the span, but in the apparatus employed, it is found that a movement of about three-eighths of an inch is amply sufficient. No very delicate adjustment of the device is then needed; and this movement is secured with a rise in temperature of about twenty-five degrees.

In the detector, the steel channel bar plays an important part for it also expands and contracts with change in temperature, but since its heat capacity is greater than that of the wire, it changes more slowly. The wire will lengthen and close the alarm circuit if heated suddenly; on the other hand, the slow changes in temperature, due to heating and warming of the room in normal ways, or due to climatic changes, not only do not actuate the detector, but do not even change its adjustment. The detector, when properly set, will respond quickly to a sudden rise in temperature of twenty-five degrees independently of the temperature of the room before the rise. In fact the system is being used not only to protect houses, but in various types of mills where the temperature changes are often sudden and large.

As in any device of this kind, frequent testing is essential in order to insure that the apparatus is always in order, arrangement is made in the detector so that the circuit-closing weight can be lowered between contact fingers. This is done by means of a weight carried on one arm of a bell crank, to the other arm of which one end of the copper wire is attached. This weight is held by a stop in a fixed position. Upon raising it, the span is slightly slackened, allowing the circuit to be closed. When released, the wire immediately returns to its original position and the indicator adjustment has not be disturbed.

These detectors are installed wherever protection is to be secured, and wires are carried from them to a central point where the alarm is to be given. Here all the circuits of the different indicators are brought together in an indicator, each passing through a drop indicator which, upon being opened, shows the point from which the alarm has come. At the same time a large gong is started ringing, calling instant attention to the alarm, and a buzzer is also started which continues in operation until the indicator itself has returned to its normal position. Although the gong may be stopped, the shutter can only be restored and the buzzer stopped when the fire is out or the detector circuit opened from some other cause. When connection is to be made with a fire company, there is, in addition, an automatic telegraph instrument which sends in a code message to the fire company. This message is repeated four times, and at the same time an indicator at the fire company's house shows from where the call has come. This not only confirms the telegraphic signal, but makes it unnecessary to maintain a skilled telegraphic operator there. The repeating of the telegraphic signal three times, making four calls in all, prevents the calling out of the company due to a false alarm caused by an accidental closing of the circuit, or by testing or a short-circuit occurring anywhere on the line. The company will not respond until the code signal has been received four times.

In addition, at the receiving station, there is a voltmeter and an arrangement of switches for connecting this in circuit through the various indicator, bell and buzzer circuits. Under each switch is a label stating what potential should be maintained on that circuit. This enables any one to test quickly the system and insures that all the batteries are in working order.

The system, as at present installed, is the result of several years' evolution and experience. As described above, it is operated on the open-circuit principle, but it can, of course, be worked as well on a closed circuit.

Civil Service Examination for State and County Service.

The New York State Civil Service Commission will hold examinations, November 16, for the following positions: assistant civil engineer, Public Service Commission, First District, $1,500 to $1,800; assistant steam engineer, state and county institutions, $600 to $900 and maintenance; bridge designer, $1,500 to $2,100; bridge draftsman, $1,200 to $1,500; civil engineering draftsman, $4 to $5 per day.

The last day for filing applications for these positions is November 9. Information, with application forms, may be obtained, upon postal card request, from Charles S. Fowler, chief examiner, Albany, N. Y.

Navy Department Electrical Supplies.

The Bureau of Supplies and Accounts will open bids in Washington, D. C., on November 12, 19 and December 3 for the following electrical material: miscellaneous electrical supplies for New Orleans, La., and Portsmouth, N. H.; one generator for California City Point, California; and 44,000 incandescent lamps for Portsmouth, N. H.

Current Electrical News

DOMESTIC AND EXPORT.

NEW POWER COMPANY INCORPORATED—Articles of incorporation of the Sierra Buttes Canal and Water Company has been filed in the county clerk's office at San Jose, Cal. The company is formed for the purpose of acquiring and disposing of water for irrigation, domestic and municipal purposes; the development of water power, the generation of electricity and all other lawful usages. The company is incorporated for fifty years. The capital stock will be $1,000,000. The amount actually subscribed is $11,000, of which E. A. Hayes subscribed $10,000, M. B. Hayes $500 and A. H. Michener $500. The directors for the first year will be E. A. Hayes, M. B. Hayes and A. H. Michener.

UNION ELECTRIC LIGHT AND POWER TO VOTE ON INCREASE OF CAPITAL TO $18,000,000—The stockholders of the Union Electric Light and Power Company, of St. Louis, Mo., a subsidiary of the North American Company, will act on a proposition to increase its capital stock from $10,000,000 to $18,000,000 on December 2. It is understood that the principal reason for the extension of the working funds of this company is that the company has made great improvements locally, which have necessitated fresh capital. The company also desires to care for the $3,000,000 five per cent collateral trust notes, falling due February 15, 1909, which, under their issuing agreement, must be paid or included in the new indebtedness, before any additional liabilities can be incurred.

FISHER SYNDICATE SECURES CONTROL OF ANOTHER ELECTRIC LINE—At a meeting of the stockholders, the deal by which the Fisher syndicate, of Joliet, Ill., assumes control of the Bloomington, Pontiac & Joliet Electric Railway was approved and the formal transfer voted. The resignation of President J. A. Carothers and Secretary A. C. Folsom, both of whom were directors, were filed and C. E. Legg, also a director, retired. H. A. Fisher was elected president; John K. Newhall, secretary, and L. D. Fisher, general manager and director. W. H. Ogan, of Tipton, Ind., engineered the deal and will assist in financing the road. The capital stock will be increased to $2,500,000 and the extensions to Bloomington and Joliet will be pushed. At present the road is in operation only between Pontiac and Dwight. With the construction of the lines over the present gaps continuous trolley lines between Chicago and St. Louis will be assured.

WESTERN ELECTRIC COMPANY REPORT—The gross sales of the Western Electric Company for the fiscal year ending November 30, 1907, are officially estimated at $50,000,000. According to a report from Chicago the forthcoming annual report will compare as follows: 1907, gross sales, $50,000; 1906, $69,245,331; 1905, $44,145,753; 1904, $25,500,000. In other words the current fiscal year has been the best, with the exception of last year, in the company's history. It stands midway between last year and the previous year in point of volume of business and earnings. Like all other industrial companies, the Western Electric has had to face an advancing operating ratio, but officials say not a disproportionate one. This fiscal year's decrease in gross sales exceeded twenty-seven per cent, as against the previous year's increase of more than fifty-six per cent. The current business outside of the telephone department is one-third larger than a year ago. The Chicago report adds: "There has been so much gloomy talk about the company's current business it will surprise most people to learn that the company is putting more men to work than it is discharging. Paralysis of the telephone industry, however, has cut a big hole in Western Electric's gross output, and its payroll is fully twenty per cent smaller than it was a little more than a year ago when it was abnormally high. Western Electric's telephone manufacturing business is not half as large as it was, while its electrical industry has nearly doubled."

PERSONAL MENTION.

MR. F. R. YARBROUGH, for two years manager of the Atlanta, Ga., office of the Southern Bell Telephone and Telegraph Company, has resigned.

MR. M. A. BEAL has resigned his position as manager of the Rockford Edison Company, Rockford, Ill., to look after business interests in the East. Mr. Beal has been connected with the electric light service of Rockford for the past twenty years.

MR. GEORGE L. WRIGHT, superintendent of the Oswego, N. Y., Traction Company since its absorption by the Beebe syndicate has resigned and has been succeeded by William E. Haven. Mr. Haven was formerly assistant superintendent of the Auburn & Syracuse Electric Railroad Company.

MR. RICHARD BARRATT, who has been superintendent of the East End Passenger Railway Company, Williamsport, Pa., for the past three years, has been promoted to be superintendent of the Milton & Lewisburg line which is owned by the Railways Company General. Mr. Barratt will have his office at Milton, Pa.

MR. MILTON C. ROACH, for many years assistant general passenger agent of the New York Central & Hudson River Railroad, during which time he conducted a large number of special trains to conventions in which central station and street railway men were interested, for some time past has been interested as secretary and treasurer of the Huntoon Spring Water Company. This company has installed one of the most extensive plants in the world for the bottling of spring water at Ellenville, N. Y. This water is taken from a newly discovered natural spring in the Shawungunk Mountains in Ellenville, and chemical analysis shows it to be the purest potable water obtainable. On Saturday, October 19, Mr. Roach entertained a number of prominent New York bankers and business men, the party going in a special train from New York city to Ellenville. Among the electrical men present were H. L. Shippy, treasurer of the John A. Roebling's Sons Company, and Cyrus O. Baker, the well-known platinum king.

MR. C. F. DE MURALT, a well-known New York consulting engineer, has been appointed to fill the recently created chair of applied electrical engineering at the University of Michigan. Professor Muralt, who has assumed his duties at the university, will continue in active practice, as it is the desire of the university authorities that the instruction in the new department shall be under one who is in close touch with the advances in the application of electricity in its various branches. Professor Muralt was born in Brooklyn in 1873, and received his education in the Polytechnic at Zurich, and at the University of Munich, Germany. For several years he was connected with the General Electric Company, working through the Schenectady shops, after which he was sent to Geneva, Switzerland, to take charge of the power and lighting department of that office. In this capacity he carried out important pioneer work, including the city lighting plant of Madrid, Spain, the first European installation to use high-tension transmission and large underground transformer stations. During his stay in Europe, Professor Muralt maintained for his company the record for high-voltage construction, and during this time he was in close touch with the developments in three-phase railway apparatus. In 1903 he returned to New York and organized the firm of Muralt & Company, consulting engineers, and since that time he has carried out a number of important installations. Professor Muralt is a member of the American Institute of Electrical Engineers, and has contributed a number of papers to the transactions. These include "Notes on European Practice in Polyphase Alternating-Current Railway Work" and "Heavy Electric Traction Problems." Under his supervision, Muralt & Company has begun the publication of "The Electric Trunk Line Age," a monthly journal devoted to problems of heavy electric railroading, which is especially designed for railroad officials and others interested in bettering traffic conditions on trunk lines.

ELECTRIC LIGHTING.

BLOOMINGTON, ILL.—The municipal electric light plant will install fifty new lights.

RANDOLPH, VT.—The White River Electric Company's contract for lighting the village has been renewed.

CHEWELAH, WASH.—The council has let the contract for the electric light plant to Fairbanks, Morse & Company, Chicago, Ill.

MONTEREY, CAL.—Improvements to cost $100,000 are being made at the plant of the Monterey County Gas and Electric Company.

TEAGUE, TEX.—The management of the Teague Electric Company has let the contract for additional machinery to be used in its plant.

WENATCHEE, WASH.—Wenatchee Electric Company will install about twenty arc lights of 2,000 candle-power on the main street of Wenatchee.

BURLINGTON, KAN.—The city council has made a five-year contract with the Burlington Electric Light and Power Company. Hitherto the city has paid for its lights by the month.

ORANGE, TEX.—In accordance with a contract entered into between the Orange Ice, Light and Water Company and the city council of Orange, ten additional arc lights will be installed.

MARYSVILLE, CAL.—The city council has arranged for a number of fifty-candle-power arc lights in the Fifth street subway. The lamps will be placed on the trolley poles of the Northern Electric Company.

BEAUMONT, TEX.—At a meeting of stockholders and directors of the Beaumont Ice, Light and Refrigerating Company, action was taken looking to expanding the company's plant and facilities in this city.

WOODBURY, PA.—The Woodbury city council has passed over the mayor's veto the ordinance for the purchase of land and the erection of an electric light plant for the city, and will proceed to install the plant.

HILLYARD, WASH.—The Hillyard city council has decided to enter into a contract with the Washington Water Power Company for the installation of nine arc lights at $60 each per annum. The contract is to continue for five years.

LEWISTON, IDAHO—Orofino is to have an electric light and water system. B. F. Lynch is securing data as to the cost of installing a water-power plant. The plan is to bring the water from a point about a mile up Orofino Creek.

PLATTSMOUTH, NEB.—Plattsmouth streets will be lighted by Omaha power. A contract to furnish light to the city has been given to Earl C. Westcott, of this city, who is the agent for the Omaha Electric Light and Power Company.

CONOWINGO.—The Conowingo Company has been organized with a capital of $10,000, with the privilege of floating bonds to the extent of $10,000,000, to generate electric current by means of a dam across the Susquehanna at Conowingo.

READING, PA.—The Birdsboro Electric Company has given notice of a stockholders' meeting to be held at the company's office to approve or disapprove the increasing of the capital stock from $12,000 to $20,000. The time set for the meeting is December 7.

WARSAW, N. Y.—J. C. Horning, of Lamont, is endeavoring to interest capitalists in a scheme to construct a dam across the East Koy creek at that place for the purpose of developing power for electric lights to be used in Castile, Silver Springs and Gainesville.

MONTGOMERY, ALA.—It is rumored that the Montgomery Light and Water Power Company will spend $100,000 shortly in improving its gas and electric light system. The company proposes to double its line to Tallassee, thirty miles away, where the power plant is located.

SILVER LAKE, ORE.—It is understood that C. L. Withers, of Portland, brother of C. N. Withers, of Paisley, will ship an electric power plant to Paisley, to be installed on the Chewancon river, above the town. Power will be furnished for the new flour mill and for lighting purposes.

PEORIA, ILL.—The Peoria Gas and Electric Company has received a new dynamo with a capacity of 3,000 lights. This will be installed as soon as the work of remodeling the power-house is completed. One hundred and fifty new arc lamps are to be put in operation.

WASHINGTON, D. C.—The government has awarded contracts for the electrical work at the irrigation plant on the Salt river, Arizona. The Wagner Electric Manufacturing Company, St. Louis, Mo., will furnish the transformers, and the General Electric Company the switchboard apparatus.

CENTRAL CITY, NEB.—L. E. Jenkins and J. Forrest, of Omaha, are promoting an electric lighting proposition for Central City, and are meeting with considerable success. If they receive the necessary encouragement they propose to put in a plant to cost not less than $10,000, and are willing to let local capital take half the stock.

SCRANTON, PA.—By an arrangement with the Delaware, Lackawanna & Western Railroad the Scranton Electric Company has secured additional power. Contracts have been entered into whereby the electric company gets all the power generated in the Lackawanna's Hampton plant at night. This power is the equivalent of 50,000 sixteen-candle-power lights.

GRESHAM, ORE.—A surveying party is out on Oak Grove Creek, above Estacada on the Clackamas river, running lines for the establishment of a new electric power plant. Oak Grove Creek is a tributary of the Clackamas and offers good opportunities for power development. The plan is to construct a canal for a distance of eight miles along a hillside, which will give a fall of 1,000 feet and will generate 40,000 horse-power.

NIAGARA FALLS, N. Y.—The street committee of the common council has reported the franchise of the Niagara Falls Lighting Company. By the terms of the franchise the company shall provide a surety bond of $10,000, guaranteeing that within two years from the time the franchise is signed, the company shall be actually delivering power for commercial and lighting purposes. In the event of its failure so to do the franchise will be abrogated and the bond forfeited.

HARTSELLE, ALA.—At a meeting of the stockholders of the Hartselle Electric Light and Power Company, the following officers and board of directors were elected: president, J. J. Cudd; secretary and treasurer, J. Leldon Day. Board of directors: J. L. Day, M. D. Wiggins, J. C. Rogers, J. R. Sample and J. J. Cudd. A purchasing committee was also elected by the company and a suitable plant will be installed. The stock of the new company was readily taken up by local business men.

BATTLE CREEK, MICH.—The new lighting contract between the city of Battle Creek and the Citizens' Electric Company has been signed. It covers a period of five years, from October 1, 1907, to October, 1, 1912. The Commonwealth Power Company has had a total of 165 lamps in operation under its contract, and will now contract to furnish all-night service on the same basis as the Citizens' company. The Commonwealth formerly had thirty-six all-night lights at $77 per annum, and 135 midnight lights at $65 per annum. The Citizens' company had thirty-two all-night lights at $77 and forty-nine midnight lights at $65, making a total cost to the city of about $16,734 annually. Under the new arrangement the city has contracted for about 246 all-night lights at $70 per annum, which will cost about $17,220, making an increase in the lighting cost of only $486, and giving all-night lights in all parts of the city.

DATES AHEAD.

Jamestown Tercentennial Exposition. Norfolk, Va., April 26 to November 30.

American Association for the Advancement of Science. Chicago, Ill., December.

South Dakota Independent Telephone Association. Mitchell, S. D., January 8-9, 1908.

Chicago Electrical Show. Coliseum, Chicago, January 13-25, 1908.

International Independent Telephone Association. Annual meeting, Chicago, Ill., January 21, 22 and 23, 1908.

TELEPHONE AND TELEGRAPH.

CHEHALIS, WASH.—The city council has passed an ordinance granting a franchise for a local system to the Northwestern Long-Distance Telephone Company.

FEKIN, ILL.—The Bell Telephone Company has decided to rebuild its entire system in Pekin. The plans for this proposed work have been in the hands of the officials for the past several months and they now state that a force of men will shortly begin work.

RICHMOND, VA.—The Dinwiddie County Telephone Company has received its charter, and the board of directors has instructed Superintendent David A. Barner to begin the work of erecting poles and stretching wires at once. The central office of the company will be at DeWitt.

WOODSTOCK, N. B.—The citizens of Woodstock have decided to install and operate a telephone system. The organization will be controlled locally, and will be known as the Citizens' Telephone Company, Limited, with a capital of $24,000 divided into $10 shares. It is estimated that an automatic system can be installed for about $15,000. A considerable part of the necessary capital has already been subscribed.

MILWAUKEE, WIS.—The question of constructing an independent telephone toll line to be financed by capitalists interested in the Valley Telephone Company, Appleton, and the Milwaukee Independent Telephone Company, is under consideration. The proposed line is to connect all the independent exchanges in the state, and it is said that the new service will be in operation within six months.

SPOKANE, WASH.—The Interstate Telephone Company has opened a second telephone line to St. Maries, Ida., east of Spokane, the service being by way of Mount Hope and Rockford. The two new circuits of the company between St. Maries and St. Joe have been completed, and also the construction of twenty miles of new line up the St. Joe river along the Chicago, Milwaukee & St. Paul Railway Company's new line. The company will also extend the line to Harrison.

ROCHESTER, N. Y.—The United States Independent Telephone Company has sold its holdings in the Home Telephone Company, of Jamestown, N. Y., to a group of Jamestown capitalists, represented by Arthur C. Wade, of Jamestown. The negotiations looking to this sale were begun last winter. It is said that the Consolidated Telephone Company, of Buffalo, and the Jamestown company, through the Inter-Ocean Telephone Company, a long-distance subsidiary of the Consolidated, will hereafter hold a close working agreement as a result of this sale.

HOUSTON, TEX.—The officials of the Houston Home Telephone Company, which is to install an automatic system in Houston, have deposited with the city assessor a certified check for $2,500, required by the ordinance granting the franchise as an earnest that the company will within eighteen months from the date on which the franchise ordinance was adopted have completed ten miles of conduits and pole lines inside the city limits. Active work will begin within the next sixty days. The system will be extended to Houston Heights and a sub-exchange installed at that place.

SPOKANE, WASH.—The Twisp-Barron, Twisp-Conconully and Twisp, Chelan and Wenatchee telephone lines are projects growing out of the visit of Forest Supervisor George W. Milham to Twisp, Wash., northwest of Spokane. The Twisp-Barron line extends forty-five miles to the north from Twisp, passing through Winthrop, Mazama, Robinson and to Barron in the Slate Creek mining district. The Twisp-Conconully line traverses forty miles to the eastward over the old Loop Loop road. The Twisp-Chelan line covers twenty-six miles to the southwest over the Gold Creek trail, and the Wenatchee extension adds seventy miles more. Mr. Milham has made a proposition that the department will furnish all the material for the construction of the lines and string the wires if the people will prepare, deliver and place the poles in position, and cut out the right of way. There is to be no charge for the use of the service. Instruments will be placed at the various points along the lines. Barron, Robinson, Winthrop and Mazama are now without telephonic communication with the outside world.

ELECTRICAL SECURITIES.

Once again the market was characterized by falling prices and at the end of the week prices of securities had been reduced to new low levels, the losses running from five to fifteen points. The whole week was one of unsettlement, the Heinze United Copper smash, together with the Mercantile National investigation by the Clearing House committee, resulting in the retirement of the bank's directorate, helped by the unfortunate investigations and disclosures now going on, giving little indication of immediate improvement. At the same time, the decline in values has discounted all adverse conditions that are apparent, and it is believed by many that purchases made at this time can not but show ultimate large profits.

Dividends have been declared upon the following electrical securities: Automatic Electric Company; regular quarterly dividend of two per cent, payable November 1. Montreal Light, Heat and Power Company; regular quarterly dividend of one and one-half per cent, payable November 15.

ELECTRICAL SECURITIES FOR THE WEEK ENDING OCTOBER 19.

New York:	*Closing.*
Allis-Chalmers common	6⅛
Allis-Chalmers preferred	15¼
Brooklyn Rapid Transit	38⅞
Consolidated Gas	85½
General Electric	109½
Interborough-Metropolitan common	7¾
Interborough-Metropolitan preferred	17½
Kings County Electric	100
Mackay Companies (Postal Telegraph and Cables) common	53½
Mackay Companies (Postal Telegraph and Cables) preferred	54
Manhattan Elevated	112¾
Metropolitan Street Railway	—
New York & New Jersey Telephone	90
Western Union	66
Westinghouse Manufacturing Company	108
Boston:	*Closing.*
American Telephone and Telegraph	100¼
Edison Electric Illuminating	199½
Massachusetts Electric	39
New England Telephone	—
Western Telephone and Telegraph preferred	—

The listing of American Telephone stock on the London Exchange carries out the plan which the company announced in July after the close of subscriptions to the $22,000,000 of new stock. Thirty thousand shares of stock were taken by a prominent London financier to be distributed to investors in England and Scotland. The American Telephone and Telegraph Company has had for several years a considerable number of stockholders in England. The listing of the stock on the London Exchange will give a near market to these holders as well as afford a means for distribution of the stock sent abroad in July.

Philadelphia:	*Closing.*
Electric Company of America	8⅜
Electric Storage Battery common	35
Electric Storage Battery preferred	35
Philadelphia Electric	6¾
Philadelphia Rapid Transit	16¾
United Gas Improvement	70¾
Chicago:	*Closing.*
Chicago Telephone	107
Chicago Edison Light	137½
Metropolitan Elevated preferred	62
National Carbon common	70
National Carbon preferred	118

Directors of the Commonwealth-Edison Company have declared a dividend at the rate of eight per cent on the first installments paid on Chicago Edison Company stock, covering a period from September 10 to November 1.

OBITUARY NOTE.

MR. ROBERT BARRY SULLIVAN, treasurer of the Denver Gas and Electric Company, Denver, Col., died on October 10 at Mercy Hospital, Denver, as the result of an operation for appendicitis. Robert Barry Sullivan was twenty-nine years old, having been born in Central City, Col., June 29, 1878. He was the only remaining son of Dennis Sullivan, one of Denver's wealthiest citizens. He graduated from Yale in the class of 1900, and on February 1, 1902, was married to Miss Mary Morey.

ELECTRIC RAILWAYS.

MANSFIELD, ILL.—The Mansfield council has granted a fifty-year franchise to the Corn Belt Traction Company.

CROOKSTOWN, MINN.—At a meeting of the city council a street railway franchise was granted to W. A. Marin. The road is to be in operation within three years.

GRAFTON, W. VA.—It is said that the Grafton Traction Company, which is building a street railway over the principal streets of Grafton proper, will extend its lines to both West Grafton and South Grafton.

HARRISBURG, PA.—Governor Stuart has approved the extension of the line of the Shamokin & Edgewood Electric Railway Company from Shamokin to Sunbury. This company is headed by ex-Congressman M. H. Kulp.

OAKLAND, CAL.—Application for a franchise for an electric street-car line connecting the San Leandro road with the newly opened Toler tract has been filed with the board of supervisors. Ira A. Miller is behind the movement.

NORTH ADAMS, MASS.—The contract has been let for the construction of the new high-tension line for the Berkshire street railway, the Adams selectmen having granted the necessary permission. The cost of the line is estimated at $65,000.

SYRACUSE, N. Y.—Directors for the Syracuse & South Bay Electric Railroad Company were elected by the stockholders as follows: A. K. Hiscock, W. M. Brown, of New Castle, Pa.; William Nottingham, W. A. Mackenzie, Jr., W. T. White, of Trenton, N. J., and Harry J. Clark.

OMAHA, NEB.—It is expected to begin work at South Omaha in the early spring on the Omaha-Hastings interurban line, which will be rushed to completion at a cost of over $4,500,000. A part of the road will be in operation in about a year, and the whole project will be completed in two years.

BLOOMINGTON, ILL.—The Bloomington, Pontiac & Joliet Railway Company has completed arrangements for the extension of the line to Joliet. The extension will be built south from Pontiac to Bloomington and from Dwight north to Joliet. Fisher Brothers, of Joliet, will do the construction work.

WALTHAM, MASS.—The Massachusetts railroad commissioners have approved of the consolidation of the Waltham Street Railway with the Newton Street Railway Company, and an issue of 1,000 shares (par $100,000) new stock of the Newton company is to be exchanged for Waltham company shares.

COLUMBUS GROVE, OHIO—A movement is on foot to build an electric line from Delphos to Wapakoneta, passing through the towns of Kossuth, Buckland and Spencerville. The road will connect the Western Ohio and the Springfield & Fort Wayne lines. It will be an important link in the traction network in western Ohio.

PUEBLO, COL.—The city council has granted a franchise to M. Douthitt to construct and operate an electric interurban line between Pueblo and Blende, using all city highways en route. It is the intention of the interurban people to build immediately as far as the zinc smelter, and later continue to Rocky Ford and La Junta.

CHEHALIS, WASH.—The city council has granted a franchise to Ben J. Weeks and his associates under the name of Centralia-Chehalis Electric Railway and Power Company, for an electric railway in this city and between this city and Centralia. Mr. Weeks is to begin work within sixty days and to have the road in operation within one year.

MARSHALLTOWN, IOWA—The business men of Marshalltown have agreed to subscribe $25,000 for the Melbourne interurban project, promoted by Hamilton Browne. It is expected that the banks here will take over another $25,000, and if they do Browne agrees to build the road. A three per cent tax has already been voted to aid the project, but to get the tax the road must be built and in operation by July 1 next.

OTTAWA, ILL.—The Chicago, Ottawa & Peoria Railway Company has filed its written acceptance of the ordinance and franchise granted it about three months ago. It is not the intention of the company to do any actual building this year, but to complete all the preliminary work and secure franchises in Minooka and Joliet and the right of way between these cities, so as to avoid delay when work is begun in the spring.

FOND DU LAC, WIS.—Work has been begun on the permanent survey of the Milwaukee & Fox river railway line out of Fond du Lac. The contract for the work has been let to the Milwaukee Construction Company. The line will connect with the Knox Transportation Company, either at Appleton or Kaukauna. It is expected that the grading will commence this fall, but steel will not be laid until spring. A traffic arrangement will be made with the Milwaukee Northern.

WAYCROSS, GA.—Application for a charter for a street railway in Waycross has been made, the capital being $300,000. The company will put down at least fifty miles of track, and will operate extensively in Waycross and surrounding territory. A line to Blackshear and one to Waresboro will be added to the street railway system. The petitioners include a number of Waycross citizens, and several outside capitalists. It is thought that work on the system will commence within the near future, by the middle of November at the latest.

WEST CHESTER, PA.—At a meeting of the borough council of West Chester, President A. Merritt Taylor, of the Philadelphia & West Chester Trolley Company, presented a plan for trolley freight through this borough from Coatesville and Kennett Square to Philadelphia, under a joint arrangement of the Philadelphia & West Chester road and the West Chester Street Railway. Council granted to President Taylor authority to connect his tracks with the tracks of the West Chester road at the Green Tree Inn, thus completing the trolley line between Philadelphia and Coatesville, and then on to Parkesburg.

LAFAYETTE, IND.—At the first day's session of the October term of the county commissioners' court a franchise was granted to the Chicago & Western Indiana Traction Company to construct and maintain an interurban railroad over and across described highways in Fairfield, Wea and Randolph townships in Tippecanoe county. Beginning at the south corporate limits of the city the line will run along the Southern gravel road and then along the Romney road, crossing a number of other highways. There are a number of provisions in the franchise. One is that the road shall run from Lafayette to Crawfordsville.

PORTLAND, ORE.—Extensive improvements are to be made to the system of the Portland Railway, Light and Power Company. President B. S. Josselyn announces that more than 100 new cars will be added to the rolling equipment of the company's lines this year; that a new ferryboat will be constructed for operation between the Oregon side and Vancouver, on the Columbia river; that club houses, models of convenience and comfort, will be built at the big Portland car barns; that additional electric power will be generated by enlarged plants, and that a central depot for the entire Portland system will be built as soon as the matter can be worked out.

PORTLAND, ORE.—Prineville is the destination of an electric railroad that is being constructed by Portland and eastern capital from Eugene and Springfield, *via* the McKenzie river. The company has acquired right of way for forty miles up that stream, has begun construction of its line from Eugene to Springfield, a distance of four miles, and is about to let the contract for a $40,000 bridge across the Willamette river at that point. Behind the railroad are the Story-Bracher Lumber Company, A. Welch and associated capitalists. A new railway system has been completed at Eugene, and this is to form the nucleus of the electrical development eastward from the Willamette valley to central Oregon.

NEW MANUFACTURING COMPANIES.

SPRINGFIELD, ILL.—The Ajax Battery Company has been incorporated with a capital of $25,000 to manufacture batteries and other apparatus. The incorporators are: W. B. Davis, C. E. Gaylord and W. T. Jones.

PARKERSBURG, W. VA.—The Davis Electric Company, of this city, has been incorporated with a capital stock of $350,000, and the following local men are the incorporators: J. Mentor Caldwell, H. H. Dils, Samuel M. Dils, George P. Chase and Jesse R. Davis. The company has been formed to exploit the electro-medical battery invented by Jesse R. Davis.

INDUSTRIAL ITEMS.

THE LIDGERWOOD MANUFACTURING COMPANY, 96 Liberty street, New York city, in bulletin No. 21 describes and illustrates slip drum electric winches for hauling in car floats.

THE H. W. JOHNS-MANVILLE COMPANY, 100 William street, New York city, has published a very interesting booklet, entitled "Fuse Talks," devoted to a study of the characteristics of "Noark" fuses.

THE ROONEY ELECTRIC LAMP COMPANY, 155 East Twenty-third street, New York city, has ready for distribution some new literature describing and illustrating the "Sun-Star" turn-down electric lamp.

THE GOULDS MANUFACTURING COMPANY, Seneca Falls, N. Y., has published a handsome catalogue devoted to triplex power pumps and their many applications for modern buildings, factories, municipal and general water supply, and other hydraulic problems.

THE WESTERN ELECTRIC COMPANY, Hawthorne, Ill., is making another distribution of the pamphlet devoted to its famous Hawthorne works. This pamphlet gives some indication of the great resources of the Western Electric Company for the building of power apparatus.

THE H. T. PAISTE COMPANY, Philadelphia, Pa., in the October issue of "Paistery" describes and illustrates the weatherproof socket plug; Paiste rosette sockets, Fielding receptacles, Fielding bracket rosette, Fielding show-window receptacles. This bulletin will be sent to any one interested upon request.

THE ELECTRIC MOTOR AND EQUIPMENT COMPANY, Newark, N. J., announces that W. R. Grace, New York city, has placed a large order for a lot of electrically illuminated signs and decorative flashing effects for Chile, S. A., customers. Among the features is a large, waving Chilean flag, furnished with lamps of appropriate colors and flashing mechanism and motor.

THE AUTOMATIC REFRIGERATING COMPANY, Hartford, Ct., has published a very instructive circular devoted to this company's refrigerating system. The company announces that a customer has recently advised that as compared with ice bills of $150 and $160 respectively for the month of May and June, his power bill to operate an automatic refrigerating system, maintaining a temperature of twenty-four degrees, instead of forty-four degrees, was respectively $31.56 and $34.52.

THE CENTRAL ELECTRIC COMPANY, Chicago, Ill., is mailing to the trade a price list dated October, 1907, which applies to the company's 1906 and 1907 general catalogue No. 24. This price list has been revised to date and contains the very latest market figures in force at this time on all electrical appliances shown in the company's catalogue. It will therefore be of considerable interest and benefit to all purchasers of electrical material, and the company requests that all holders of its catalogue who have not received a copy should write for one. In the back of the price list considerable space is devoted to the W. U. steel bracket which is intended to replace the ordinary oak wood brackets. Attention is also called to the Central Electric Company's fixture department, and an illustration of a very attractive reading lamp is shown. The company states that this department is carrying a large assortment of the most up-to-date lamps and lighting fixtures and will be glad to submit designs and quotations upon request.

NEW INCORPORATIONS.

AUSTIN, TEX.—The Texas-Oklahoma Telephone Company, of Paris. $5,000. Incorporators: T. A. Johnson, W. T. Scott, J. W. Ownsby and others.

SPRINGFIELD, ILL.—The East St. Louis & Suburban Railway Company, located at East St. Louis. Increase in capital stock from $3,500,000 to $3,750,000.

EATON, COLO.—Eaton Electrical Company. $25,000. Incorporators: W. A. Farr, Roscoe Farr and G. H. Genio. To furnish light, heat and power to Eaton and the adjacent territory.

COLUMBUS, OHIO—The Western Electric Company, Cincinnati. $50,000. Incorporators: Eldon R. James, Stanley M. Withrow, Frederick F. Downs, W. S. Berry and L. T. Milner. A reorganization of the Standard Electric Company.

MUSKOGEE, I. T.—Bradley Power Company, with offices at Chickasha. $75,000. President, Lawrence Martin; vice-president, B. Seery; secretary and treasurer, R. A. Martin. To build and operate a water power plant on the Washita river.

SPRINGFIELD, ILL.—Western Illinois Electric Traction Company. $100,000. To build a road from Chicago to Aurora. Incorporators and first board of directors: M. M. Miller, Edmund J. Schmidt, Louis Crollman, Leo Michael and Will M. Klein.

OLYMPIA, WASH.—Katalla Anthracite Coalfields Railroad Company, of Seattle. $10,000,000. Incorporators: O. R. Reyburn, C. V. Totten, F. T. Wheeler. Object, to build a steam, tram or electric road from Controller Bay, Alaska, to Carbor Mountain and other points about the Bering Sea coal fields.

SANTA FE, N. M.—Sacramento Power Company, Alamogordo, Otero county. Territorial agent F. Corp, at Alamogordo. $1,000,000 divided into 10,000 shares of the par value of $100 each. Incorporators: U. S. Houghland and John A. Gilchrist, of Kansas City, Mo., and A. T. Payne, of Oklahoma City, Okla.

LITTLE ROCK, ARK.—Earle Light and Power Company. $10,000. Officers and directors: president, L. J. Machen; vice-president, W. E. Duffus; secretary and treasurer, C. C. Bird. Directors: L. J. Machen, W. E. Duffus, C. C. Bird, C. T. Whitman, M. T. Boone, Dr. J. M. McBee, Charles G. Barton, J. F. Evans, J. H. Covey, Dr. Matthews and E. J. Badinelli.

ST. JOSEPH, MO.—Missouri Valley Traction Company. $6,000. Organized to build the St. Joseph-Mirabile-Excelsior Springs trolley line. Stockholders: John I. McDonald, St. Joseph; H. G. Krake, St. Joseph; T. B. Campbell, St. Joseph; J. R. Sprague, Mirabile; L. L. Frost, Mirabile; George H. Morris, Mirabile; W. A. J. Bell, Excelsior Springs; A. M. Bates, Excelsior Springs; George Kidd, Excelsior Springs. To construct a trolley line in Buchanan, Clinton, Ray, Clay and Caldwell counties, for the transportation of freight and passengers.

Record of Electrical Patents.

Week of October 15.

867,939. LINE-WIRE SWITCH-FROG FOR ELECTRIC RAILWAYS. Harry J. Beck, Winburne, Pa., assignor to S. B. Stine and J. C. Stine, Osceola Mills, Pa. An overhead switch with pivoted arm.

868,110. ELECTRIC LAMP. Alexander P. McArthur, Orange, N. J. A refracting shade is mounted within the bulb.

868,122. ELECTRIC INSULATOR. Francis J. Poinan, Rochester, N. Y. The insulator has a glass sleeve covering the pin.

868,128. ELECTRICAL MEASURING INSTRUMENT. Frank W. Roller, New York, N. Y. A movable coil instrument.

868,141. FUSE-BOX. John O. Stivers, Denver, Col. A magazine fuse-box.

868,171. CONTROL OF ALTERNATING-CURRENT MOTORS. Friedrich Eichberg, Berlin, Germany, assignor to General Electric Company. The motor, started as a series machine, is controlled by a shunt coil.

868,190. DYNAMOELECTRIC MACHINE. Charles D. Knight, Schenectady, N. Y., assignor to General Electric Company. A method of core construction.

868,222. ELECTRIC-RAILWAY SWITCH AND SIGNAL. Alice A. Roth, Buffalo, N. Y. An automatic switch controlled by the car.

868,230. ELECTROMAGNETIC DEVICE FOR USE IN CONNECTION WITH RAILWAY APPLIANCES. Louis H. Thullen, Edgewood Park, Pa., assignor to the Union Switch and Signal Company, Swissvale, Pa. An alternating current coil and plunger magnet.

868,231. SIGNALING SYSTEM FOR ELECTRIC RAILWAYS. Louis H. Thullen, Edgewood Park, Pa., assignor to the Union

Switch and Signal Company, Swissvale, Pa. An alternating-current signaling system.

868,232. RELAY. Louis H. Thullen, Edgewood Park, Pa., assignor to the Union Switch and Signal Company, Swissvale, Pa. An insulating top.

868,233. ELECTRIC IGNITER FOR GAS-STOVES. Alfred M. Turkington, Berkeley, Cal. A spark igniter.

868,253. MANUFACTURE OF LITHOPONES BY ELECTROLYSIS. Jean B. Candau and August Candau, Eaux-Bonnes, France. Sulphate of zinc is produced electrolytically and precipitated chemically.

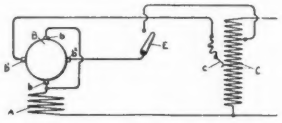
868,110.—ELECTRIC LAMP.

868,254. WATER-ALARM APPARATUS FOR VESSELS. Francis Daniel, West Somerville, Mass. An electrical alarm.

868,283. ELECTRIC-INCANDESCENT-LAMP BASE. Frederic H. Manchester, Providence, R. I., assignor to Providence Gas Burner Company, Providence, R. I. A base embodying a porcelain sleeve and an enlarged annular flange.

868,300. TERMINAL OR CONNECTING-CLIP FOR ELECTRIC WIRES. Harry E. Sohner and William H. Benjamin, Montclair, N. J. A terminal stamped from sheet metal.

868,302. SIGNALING SYSTEM FOR RAILWAYS. Louis H. Thullen, Edgewood Park, Pa., assignors to the Union Switch and Signal Company, Swissvale, Pa. A block signaling system.



868,171.—CONTROL OF ALTERNATING-CURRENT MOTORS.

868,368. WIRE-SUPPORT. Louis Steinberger, New York, N. Y. A trolley ear.

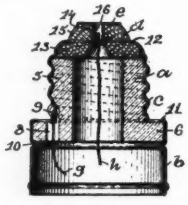
868,376. RAIL BOND. Darwin Ulke, Chicago, Ill., assignor to General Electric Company. A flexible bond.

868,379. SYSTEM OF ELECTRICAL DISTRIBUTION. Ezechiel Weintraub, Schenectady, N. Y., assignor to General Electric Company. The combination of one or more vapor electric devices which require excitation from an external source.

868,380. SYSTEM OF ELECTRICAL DISTRIBUTION. Ezechiel Weintraub, Schenectady, N. Y., assignor to General Electric Company. The combination of a plurality of vapor rectifiers, one of them only being self-starting.

868,381. MOTOR-CONTROL SYSTEM. Harold E. White, Schenectady, N. Y., assignor to General Electric Company. An electromagnetically-controlled regulator.

868,424. SIGNAL SYSTEM. Julian A. Gehrung, New York, N. Y. A despatcher's signaling system.



868,283.—ELECTRIC-INCANDESCENT-LAMP BASE.

868,460. COUPLING FOR ELECTRIC CABLES. Gustave L'Hoest, Brussels, and Henri Pieper, Liege, Belgium. A separable coupling.

868,464. CONTROL SYSTEM. Arthur S. Mann, Schenectady, N. Y., assignor to General Electric Company. A control system, itself controlled by the load on the motor.

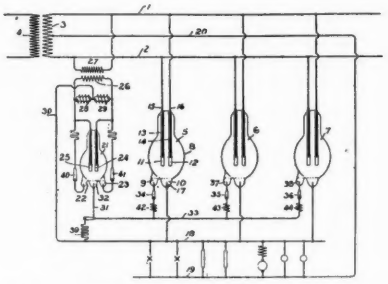
868,467. BRUSH-HOLDER. Fred P. McBerty, Warren, Ohio, assignor to the Peerless Electric Company, Warren, Ohio. A swinging holder.

868,468. ELECTROMAGNETIC APPARATUS. John McIntyre, Jersey City, N. J. A locking device.

868,502. ARC LAMP ELECTRODE. Chas. P. Steinmetz, Schenectady, N. Y., assignor to General Electric Company. The electrode consists of a powder mixed with granules of a more refractory material.

868,517. INSULATED RAIL-JOINT. Benjamin Wolhaupter, New York, N. Y., assignor to the Rail Joint Company, New York, N. Y. A joint with a short base-plate.

868,518. INSULATED RAIL-JOINT. Benjamin Wolhaupter, New York, N. Y., assignor to the Rail Joint Company, New York, N. Y. The joint has side angle bars engaging under the head of the rail.



868,379.—SYSTEM OF ELECTRICAL DISTRIBUTION.

868,519. INSULATED RAIL-JOINT. Benjamin Wolhaupter, New York, N. Y., assignor to the Rail Joint Company, New York, N. Y. An auxiliary side rail bridges the joint.

868,520. INSULATED RAIL-JOINT. Benjamin Wolhaupter, New York, N. Y., assignor to the Rail Joint Company, New York, N. Y. A joint with a sectional base-plate.

868,530. TELEGRAPH AND TELEPHONE INSULATOR. John A. Cooper, Mercury, Tex. A slotted insulator.

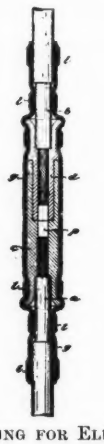
868,531. CONTROLLER-OPERATING MECHANISM. Clarence T. Crocker, Norwood, Ohio, assignor to the Bullock Electric Manufacturing Company. A regulator for controller handles.

868,544. TELEPHONE ATTACHMENT. Joseph A. Gordon, Shawnee, Okla. An auxiliary mouth-piece.

868,576. POLE-CHANGER. Ewing McLean, Greencastle, Ind. A device for converting direct current into an alternate pulsating current.

868,580. DYNAMOELECTRIC MACHINE. William D. Pomeroy, Norwood, Ohio, assignor to the Bullock Electric Manufacturing Company. A device for producing axial movement of generator frames.

868,581. SELF-WINDING CLOCK. Arthur F. Poole, Santa Barbara, Cal. The clock is wound by an oscillating magnet armature.



868,460.—COUPLING FOR ELECTRIC CABLES.

868,587. SELF-WINDING ELECTRIC CLOCK. Cleaver W. Wagner, Danville, Pa., assignor to Automatic Clock Company, Danville, Pa. The clock is wound by a ratchet moved by a magnet.

868,594. ATTACHMENT FOR PARTY-LINE TELEPHONES. James H. Blythe, Denver, Col. A device for cutting out all the telephones but one.

868,596. POTENTIAL-STARTER ATTACHMENT. Herbert W. Cheney, Norwood, Ohio, assignor to Allis-Chalmers Company, and the Bullock Electric Manufacturing Company. A controller biased toward the "off" position but can be unbiased when in the "running" position.

868,621. TELEGRAPHIC INSTRUMENT. Jerome P. Zelenka, Chicago, Ill. A telegraph instrument for attaching to the arm.